



Eyelid hygiene products: A scoping review

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1. Introduction

Daily personal hygiene typically includes handwashing, oral hygiene, showering, and facial cleansing to keep the body healthy and minimize the transmission of pathogens. As such, the Center for Disease Control (CDC) defines facial cleanliness as caring for the face, mouth, teeth, eyes and ears with soap, where appropriate, and clean running water [1]. Although many include facial cleanliness as part of their daily routine, the eyes and more specifically the eyelid margin, are often overlooked as they are more difficult to reach due to their deep-set position in the orbit. The nose, upper cheekbones and orbital bones serve as protection for the eye, but at the same time shield the eyelid margin and lashes and render them less accessible for cleaning. Furthermore, conventional wisdom recommends closing the eyes tight, shielding the lid margin, when cleaning the face or eyes to prevent any ocular irritation from ingredients of cleansers, including soap.

While commensal microorganisms reside on the ocular surface, they are not necessarily pathogenic [2]. However, an overgrowth of such microorganisms may lead to ocular inflammation and infection. Despite this knowledge, eye care practitioners (ECPs) have been more reactive than proactive at advocating eyelid hygiene. Consequently, the importance of eyelid hygiene in ocular and tear film health has been under-communicated [3]. In addition, when eyelid hygiene is recommended, many patients have the best intentions at the beginning of therapy but eventually become disinterested and non-compliant with instructions. The commensal microorganisms may overpopulate and increase the risk of inflammatory conditions, such as blepharitis [3–7], either involving the eyelashes (anterior blepharitis) or the posterior portion of the eyelid margin, involving the meibomian glands (posterior

blepharitis). Additionally, removing make-up is important to keep the lid margin healthy as several ingredients found in cosmetics [8] can affect the ocular surface and have the potential to cause irritation and inflammation.

The eye care industry has responded aggressively by promoting ocular surface and tear film health with a plethora of eyelid hygiene products intended mainly for the management of anterior blepharitis. Many of these products contain mild cleansing surfactants, but some products have added antimicrobial ingredients in an attempt to reduce the bioburden on the lashes and eyelid margin. Some contain *Melaleuca alternifolia* or tea tree oil (TTO), a natural ingredient with antimicrobial, antifungal, anti-parasitic and anti-inflammatory properties [9]. Recently, TTO and some of its components, have gained popularity for its effectiveness against the *Demodex folliculorum* mite, one of the causes of recalcitrant anterior blepharitis [10–13] and potential cause for contact lens dropouts [14].

Given the plethora of products available for cleansing the eyelids, few studies seem to be available investigating their effectiveness [15–20]. Hence, the purpose of this article was to perform a scoping review to assess the current literature on eyelid hygiene products. A scoping review, as described by Arksey and O'Malley [21], consists of a 5-stage framework, namely; 1) identifying the research question; 2) identify relevant studies; 3) selecting studies; 4) charting the data; and 5) collating, summarizing and reporting the results. The research question of this study focused on “*What is known in the existing literature on eyelid hygiene products?*”. This scoping review could assist in identifying gaps in the literature and suggest directions for future research.

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2. Methods

To identify relevant studies, a search strategy was developed with a University Health Science’s librarian to identify keywords related to the lids, lashes, lid hygiene and the treatment of lid margin disease (*i.e.* blepharitis) in electronic databases. The search was limited to publications on human studies with English or French abstracts from 1946 in Medline and from 1974 in Embase databases to November 29, 2018, using the search strategy detailed in Appendix 1. The results of both Medline and Embase searches were then imported into EndNote, a bibliographic software, in which duplicate publications were removed. A manual sifting of the dataset was performed by two optometrists to further scrutinize which studies were relevant. The first screening was performed by a single investigator (EB) who looked at the title, the abstract and, if needed, the article itself, to determine the relevance to eyelid hygiene. Studies that were not related to the study question (*i.e.* lid surgery, lid malformations, *etc.*) were discarded. A second investigator (WN) then reviewed the resulting dataset to identify whether the studies generically discussed eyelid hygiene (*i.e.* as part of an overall dry eye management) or were product specific. Studies were further discarded from the dataset if they discussed lid hygiene in a generic fashion, if the study itself did not evaluate a lid hygiene product, if the study did not involve human subjects, or if the study was a case report or a review of earlier work. The remaining studies were retained for analysis. The identification, screening and selection process are detailed in a PRISMA [22] Flowchart shown in Fig. 1. The level of evidence of each study was subsequently evaluated based on the grading scheme outlined in the Dry Eye Workshop (DEWS) Report modified from the American Academy of Ophthalmology Preferred Practice Guidelines [23].

3. Results

The search performed on Nov 29 2018 identified a total of 1636 publications (774 from Medline; 862 from Embase) (Fig. 1), which was reduced to 1239 publications once duplicates were removed. The first screening removed 1109 publications as they were not deemed relevant to the research question. Examples of these include studies on eyelid surgical procedures (*ie.* blepharoplasty), facial hygiene that is recommended to reduce trachoma in developing countries, as well as contact lens wear related topics and their effect on the ocular surface. The remaining dataset (130 publications) went through a second screening which removed 102 publications for the following reasons; 3 generic lid hygiene description, 33 review papers, 8 case reports, 9 editorials/correspondence, 2 newsletter/bulletin; 6 *in vitro* studies, 7 studies which were behind paywall and inaccessible to the institution, and 34 for other reasons (*e.g.*, practice guidelines for nurses). A total of 28 publications were retained for analysis and charting.

An Excel spreadsheet was used for data extraction from the 28 articles deemed suitable and charting of the following information was performed; author information, year of publication, country, sample size, level of evidence and eyelid hygiene product studied (Table 1). Of the 28 studies, 22 were conducted in the past decade, originating from Europe and the Middle East (10 studies), Asia Pacific (8 studies), North America (8 studies), South America (1 study) and Africa (1 study). Out of the 28 studies, 15 (53.6%) explored eyelid products available commercially and the remaining 13 (46.4%) studied shampoo, saline, and antimicrobials including TTO. Only one study provided comparisons amongst products. From the total studies identified in the scoping review ($n = 28$), There were 6 studies that were considered to be level 1 evidence, 20 for level 2 evidence, and 2 that were level 3 evidence [23].

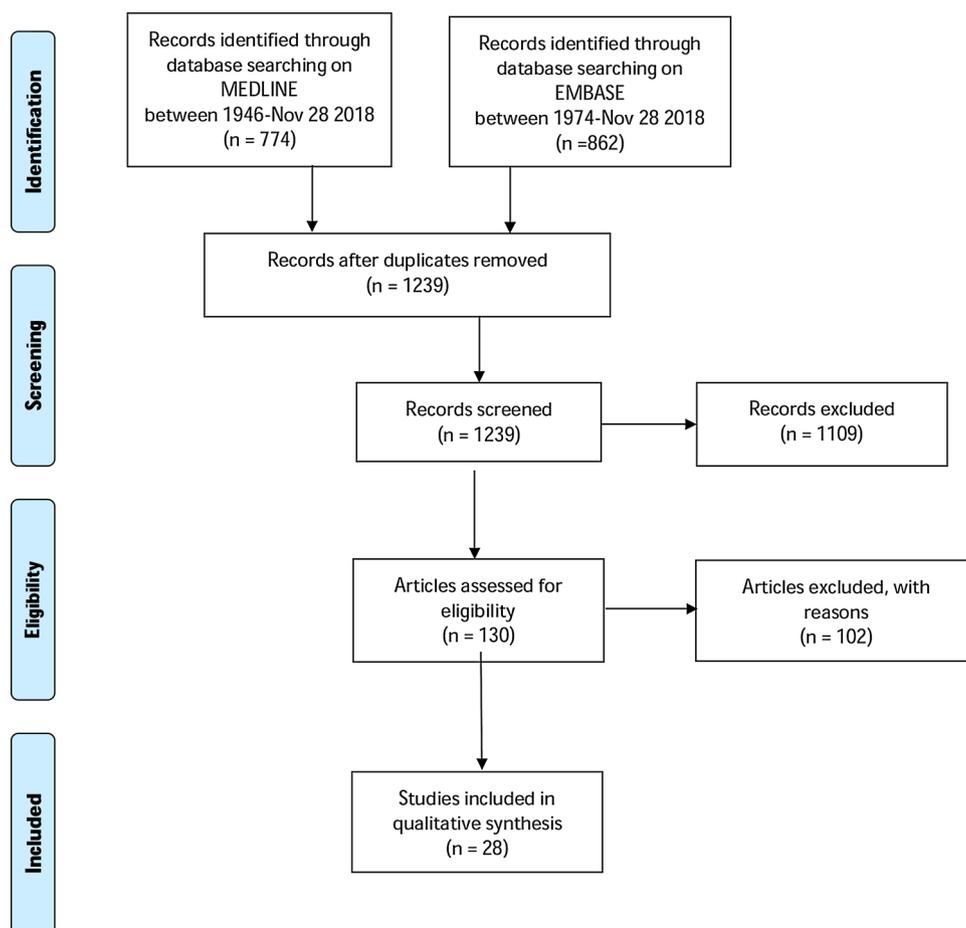


Fig. 1. Search decision flowchart (using PRISMA 2009 Flow Diagram) [22] for a scoping review on eyelid hygiene products.

Table 1
Studies on eyelid hygiene products.

Author	Year	Country	n	Level of evidence	Wipes				Gels	Pumps			Spray	Solution	Lid Swab	Other	Key findings
					Blephaclean	Citradox	Ocusoft Original	Ocusoft Plus		Blephagel	Theralid/Sterilid	Navibrief					
Karakurt et al	2018	Turkey	135	2													Symptoms (p <0.001) improved and Demodex mite density reduced (p <0.001) with the use of the TTO-based shampoo
Maher et al	2018	United Arab Emirates	40	2							X						Patients on TTO improved in symptoms, signs and tear film stability (p<0.001)
Thanathaneet al	2018	Thailand	51	2													Eye lid margin cleaning with normal saline prior to surgery did not decrease bacterial load on ocular surfaces
Sung et al	2018	New Zealand	43	1													Ocular symptoms (p<0.05) lipid layer, lid wiper epitheliopathy, cylinder collarettes, MMP-9 expression, meibomian gland capping, MUC5AC expression) was better with the use of the eyelid cleanser over baby shampoo.
Giu et al	2018	Singapore	50	1						X							No difference in live versus online video for patient instruction of baby shampoo-impregnated eyelid wipes
Murphy et al	2018	Ireland	86	1													Demodex density was reduced (p<0.05) using three methods (tea tree face wash, lid scrubs and microblepharoplasty) for 4 weeks with no difference between the methods (p>0.1)
Ngo et al	2018	Canada	25	1								X					Short term comfort of eyelid hygiene products intended for Demodex management differs amongst products and may benefit from more patient instruction
Garcia et al	2018	United States	42	1													Baby shampoo achieved comparable reduction in the bacterial load of eyelid skin as compared to povidone iodine or isopropyl alcohol prior to ocular surgery
Stroman et al	2017	United States	36	2								X					Hypochlorous acid hygiene solution reduces the bacterial load (>99% staphylococcal load) without altering the diversity of bacterial species on the lower lid
Lee et al	2017	South Korea	32	2													Mechanical meibomian gland squeezing combined with eyelid scrubs and warm compresses improves symptoms and signs (TBU), corneal and conjunctiva staining, meibum quality and expressibility
Kaido et al	2017	Japan	31	2													Symptoms and signs (vascular engorgement, melbum dendruff-like debris, corneal staining, tear film stability) improved with the use of the ointment for 3 months
Kobayashi et al	2016	Japan	10	2													eyelid hygiene with the product improves lid margin and symptoms of dry eye in MGD patients and increases eyelash length
Peral et al	2016	Spain	45	2													Eye lid and conjunctival microbiota were reduced (p=0.0011) with the wipes prior to ocular surgery
Makornwattana, Sontichai	2016	Thailand	32	2													No difference in eyelid hygiene after false eyelash removal with either water or test product (p=0.32)
Hirsch-Hoffman	2015	United States	96	3													Lid hygiene was recommended for Demodex blepharitis patients with additional management options (TTO 5%, 0.02% TTO, metronidazole 2%, oral ivermectin, oral metronidazole) for 2 months, however none proved to be clearly effective.
Arriola et al	2015	Paraguay	45	2													Signs and symptoms improved in all 3 treatment groups (shampoo; shampoo plus topical metronidazole; shampoo plus neomycin, polymyxin, deca methasone), with the first 2 groups showing more improvement in all variables studied (p<0.05).
Ali et al	2013	Sweden	120	1													Preoperative eyelid chlorhexidine alcohol wash did not demonstrate an added benefit in reducing bacterial counts in the conjunctiva when it was rinsed preoperatively with chlorhexidine solution, however it may be of some marginal help in reducing bacterial contamination of the operation field.
Koo et al.	2012	Korea	106	2													Demodex density showed a positive correlation with age and subjective ocular discomfort. The TTO eyelid scrub was more effective at reducing Demodex counts (p=0.004) and improving subjective ocular symptoms
Guillon et al	2012	United Kingdom	40	2													Improved decrease in contamination of eyelashes and meibomian gland blockage (p<0.001) at 3 weeks. Decrease in eyelid margin staining observed at 3 months.
Guillon et al	2012	United Kingdom	40	2													Improved symptoms and comfort (p<0.001) with use of wipes with a regimen of twice a day X 2 weeks followed by a maintenance of once a day.
Dean S	2012	France	56	2													Good tolerability and acceptability of the test product was rated over a 21 day use. Changes in acuity and tear film stability were non-significant
Bekibele et al	2010	Nigeria	80	2													Povidone (p = 0.001) and Savlon (p = 0.004) are effective in reducing periocular bacteria in an African setting. Prior face washing with soap and water had no added benefit.
Gao et al	2007	United States	11	2													Lid scrub with TTO can effectively reduce ocular Demodex and result in subjective and objective improvements.
Gao et al	2005	United States	9	2													TTO's in vitro killing effect on Demodex was dose dependent. Lid scrub with 50% TTO, but not with 50% baby shampoo, can further stimulate Demodex to move out to the skin.
Romero et al	2004	United States	37	2													Lid hygiene and preservative-free artificial tears significantly improved tear breakup time and relieved symptoms of MGD
Key, JE	1996	United States	25	2													Slit lamp findings (hyperemia, corneal staining, lid alteration, crusting) and symptoms improved over 4 months with eyelid hygiene with soap, diluted baby shampoo or commercial lid scrub, with patient preference for the later for convenience and use.
Avissar et al	1991	Israel	20	3													Reduction in symptoms and severity of clinical signs
Nelson et al	1990	United Kingdom	40	2													Ketoconazole was no better than placebo at improving the symptoms of blepharitis.

4. Discussion

This scoping review identified 28 studies on eyelid hygiene products published between 1946 and Nov 29 2018 (Table 1) and searchable on Medline and Embase. This finding reflects, in part, the limitations specific to this scoping review (ie. limited to English or French abstracts, human studies, databases used, etc). Furthermore, 41 publications were excluded in the second screening for reasons such as unavailability of abstract/article, practice guidelines or other reasons. Despite these limitations, the amount of studies identified through this scoping review remains low. Considering that ECPs recommend eyelid hygiene for blepharitis and dry eye disease (DED), which have a reported prevalence of 37–47% [24] and 5–50% [25], respectively, more clinical studies were expected. This scoping review highlights the paucity of level 1 clinical studies in the area of eyelid hygiene products, despite the increasing number of products available in the marketplace. Furthermore, a lack of comparative studies was noted in this scoping exercise.

While this scoping review confirms that eyelid hygiene products come in a variety of delivery mechanisms, such as wipes, gels, pumps, sprays, solutions and swabs (Table 1), there are no studies that evaluate the difference between them. A single comparative study focused on the comfort of products intended for the management of *Demodex folliculorum*, independent of product formulation (wipe, foam and swab were investigated) [19], however efficacy of the products were not studied. In addition, there is a lack of studies to determine an optimal regimen (once versus twice a day), technique and duration of the procedure (5, 10 or 15 min) for eyelid hygiene. The lack of universally accepted guidelines has been highlighted in the TFOS DEWS II Management and Therapy report [26], and is an area that can benefit from further study. Recommendations for frequency of eyelid hygiene can vary from once to twice a day [27–29].

The scoping review identified 4 wipes that were investigated across 7 studies (Table 1). The advantage of individual pre-moistened wipes is that they are a product that is single-use, sterile, and can be disposed of easily. The same towelette can be turned over for use on the other eye to limit cross-contamination or a new one may simply be used. Individual packaging makes them convenient to carry and ideal for travelers. The skin of the eyelids is one of the thinnest on the body [30], hence patients need to be educated to apply only gentle pressure along the lash line, as forceful rubbing and texture variations of some towelettes may irritate the delicate eyelid skin. Guillon et al. found a significant reduction of debris contamination along the lash line and an improvement in the composition of meibum within the first 3 weeks of intensive therapy (twice a day dosing) with a lid wipe, which was maintained with a daily regimen over a 3-month study [18]. Another study by Guillon et al. [31], using the same lid wipe, significantly improved symptoms and signs of anterior and posterior blepharitis. Peral et al. [32] investigated the reduction in the microbiota from the eyelid and conjunctiva, following eyelid hygiene with a lid wipe containing capryloyl glycine (an antimicrobial agent) on the eye scheduled for cataract surgery, and the contralateral eye serving as a control. The treated eye had a significant reduction of microbiota of the eyelid at day 3, but not a significant reduction for the conjunctiva. Incorporating antimicrobial compounds into eyelid hygiene products may help reduce the potential for ocular infections related to surgery.

Other studies [19,33] evaluated a pre-soaked wipe with 4-terpineol (T40) [34], an extract of tea tree oil, with anti-acaricidal activity against *Demodex folliculorum* infestation. These studies reported that the T40-wipes can cause transient discomfort, hence in-office education and trial is recommended to alleviate concerns and discuss that a cooling/burning sensation, similar to that of menthol, is expected. Once patients are well educated about what to expect, the product is generally well tolerated [33]. Initial treatment is typically for 4–6 weeks to coincide with the life cycle of *Demodex* mites (15–18 days) and unhatched eggs [35–37].

Key et al. compared a lid scrub with either a bar soap or baby shampoo, and found that most participants preferred the lid scrub at the end of a 3–4 month regimen due to its convenience and ease of use [38,39]. More recently, O'Murphy et al. reported a randomized controlled interventional study comparing a lid wipe, a face wash and a microblepharoexfoliation technique. All three groups showed improvement in symptoms and reduction in *Demodex* counts after a four-week trial [40].

Only one study investigated a gel lid hygiene product. Gel formulations are applied to the fingertips, hence patient education with regard to proper hand hygiene prior to use is recommended. A benefit of gel formulations is the reduced friction on the sensitive eyelid skin from the lack of a pad or towelette. A study evaluating tolerability and acceptability of a preservative/paraben/perfume-free gel formulation showed that it was pleasant to use (85% of subjects rated it acceptable) all the while alleviating blepharitis symptoms [16].

The scoping review identified five clinical studies [19,41–44] describing various pump delivery mechanisms (Table 1). Formulations that are packaged as pump dispensers can deliver the product as a mousse/foam, cream or liquid. Similar to gel formulations, the patient needs to be reminded to wash their hands appropriately prior to placing the product on their fingers. Most pumps require pushing the top of the container with minimal force to release the product. A recent study on hand sanitizers, revealed that patients preferred to use a pushdown pump over a re-closable bottle or a wipe, and that a pump required less time to access than the other products [45].

Makornwattana et al. [42] compared the performance of a foam eyelid cleanser with water to remove lash debris after false eyelashes were removed but found no significant difference between the regimens. The methodology describes that the participants 'cleaned their eyelids twice', after removal of the false eyelashes, however no details were provided with regard to the technique, length of time the lid hygiene was performed at each time point, and the delay between the 2 cleansings. The application of false eyelashes may leave chemical residue from the glue components, which can potentially irritate the ocular surface. Further investigation of the impact of false eyelashes on the ocular surface and adnexa is warranted, as this is a growing beauty trend [46].

Sung et al. showed that a foam eyelid cleanser containing TTO and linalool was more effective at alleviating both signs and symptoms related to ocular surface inflammation over baby shampoo [43]. In fact, the authors reported that both meibomian gland capping and mucin (MUC5AC) expression worsened with baby shampoo. A comparative study reported that this foam cleanser is well tolerated [19].

Hirsch-Hoffman et al. evaluated additional options for the management of *Demodex*, including a foam cleanser with 0.02% TTO and camomille. Despite the variety of topical and systemic options for *Demodex* management, there was no clear efficacious therapeutic option of those studied along with the foam cleanser [41]. A more recent study [44] using the same product, showed improvement in both signs (tear film stability) and symptoms. Both the OSDI score and TBUT improved significantly from baseline over a 60-day period compared to the control group using baby shampoo and a cotton swab. However, the authors indicated that the control group's adherence to the four times a day regimen was variable as some reported that it was too time-consuming, which may have contributed to the less than desirable compliance.

Kobayashi et al. tested a novel foaming cleanser containing anti-inflammatory (dipotassium glycyrrhizate, cholecalciferol), moisturizing (ceramide, Kjellmaniella gylate extract) and hair growth promoting properties (cholecalciferol, Panax ginseng root extract, Kjellmaniella gylate extract, and other amino acids) for its ability to maintain lid hygiene [47]. The product was gently worked into the lashes to remove debris at the lash roots, and then rinsed away with water. Participants who used this product twice a day for 8 weeks showed significant improvements in symptoms, reduction in meibomian gland blockage,

reduction in eyelid margin foam, increase in meibum secretion, longer eyelashes, and a reduction in corneal staining [47].

Typically, eyelid cleaners are found in the formulations as discussed above (ie. wipes, gels, foams or creams), but more recently, some eyelid cleansers have been formulated as sprays which are applied to a cotton pad and then rubbed onto the closed eyelids. This scoping review identified two studies [19,48] using a spray containing 0.01% HOCl, an ingredient with antimicrobial properties, effective against all bacterial (spore and non-spore forming), viral, and fungal pathogens [49]. This substance is found when neutrophils are activated [50]. The mechanism of action of HOCl is thought to work by inactivating bacterial lipases, preventing an avenue of inflammation in blepharitis [51,52]. Lid sprays using 0.01% HOCl can be dispensed onto a cotton pad and gently applied to the base of the lashes and the product can remain on the lids without the need of being washed off. The product is well tolerated by users, having a similar comfort profile to that of saline [19].

A study by Stroman et al. [48] revealed that the lower lid harbors a variety of normal bacterial flora, with staphylococci accounting for 61% of the strains identified. Following the application of 0.01% HOCl on the peri-ocular skin, a subsequent culture was taken 20 min later. The results demonstrated a significant reduction in the overall bacterial load, especially *S. epidermidis* (99.5% reduction). The clinical implication of this study is that the reduction of the bacterial load on the eyelid can potentially reduce the risk of eyelid inflammation (blepharitis) caused by bacterial overgrowth.

An *in vitro* evaluation of 0.01% HOCl versus erythromycin (a common macrolide to treat blepharitis) was studied on bacterial isolates obtained from patients with blepharitis and keratitis for its efficacy at reducing the bacterial load [53]. HOCl was found to be more effective and faster acting at reducing *Staphylococcus* spp. and *Pseudomonas aeruginosa*. It is noteworthy to mention that the different species of staphylococcus reacted differently to HOCl with *S. capitis* and *S. aureus* being the most susceptible and *S. epidermidis* being the least. The authors highlight that *S. epidermidis* is part of the normal skin flora and hence the selective bacteriocidal activity of HOCl in maintaining a bit of *S. epidermidis* may be beneficial. On the other hand, the detrimental *Pseudomonas aeruginosa*, which has been associated with contact lens associated keratitis [54,55], was sensitive to HOCl within a 60-second exposure.

Only one study using an eyelid cleansing solution has been identified through this scoping review. Lee et al. performed an open-label prospective study investigating the combination of lid scrubs using a micellar non-preserved solution, warm compresses and mechanical meibomian gland squeezing in patients with moderate to severe meibomian gland dysfunction [56]. After a month of treatment, symptoms, as well as ocular signs (tear break up time, ocular staining score, meibomian gland expressibility) improved significantly. Other authors have also found that combination therapy including lid hygiene are beneficial in dry eye management [57].

Only one study [19] using an eyelid swab was identified through this scoping review. The swab is a self-saturating disposable unit, consisting of a plastic barrel containing a combination of 50% TTO, 40% Buckthorn oil, and 10% caprylic acid, which terminate onto a cotton sponge tip. Pressure is applied to the plastic barrel, to break the internal seal, which allows the product to flow towards the sponge tip. Intended for an in-office management of advanced Demodex infestation, the saturated tip is applied to the patient's lashes and eyebrow area. The swab contains a concentration of 50% TTO which exhibits a strong odour and causes significant discomfort on the eyelid skin. Despite eye closure during the procedure, Ngo et al. reported that participants can experience considerable ocular discomfort if they try to open their eyes immediately after application [19], hence patient education is key to reassure them and the product needs to be washed off after use.

Other eyelid hygiene studies, identified by this scoping review, have used shampoos [10,58–60], saline [61], salt water [62], antimicrobial

solution/cream/ointment [63–66] or other lid scrubs [15].

5. Overall lid hygiene and education

The rationale for managing blepharitis is to reduce the microbial overgrowth and improve ocular comfort. Various studies have shown that ocular comfort is a critical driver of contact lens wear success [14,67,68], satisfaction with post-surgical outcomes [68], success with DED management [69], and may be related to problems with daily tasks such as computer use [70]. Therefore, advocating for a healthy ocular surface and counseling on the importance of eyelid hygiene should help alleviate symptoms and enhance the quality of life of patients. Furthermore, both the International Meibomian Gland Workshop [71] and the TFOS DEWSII Management [26] reports highlight the mainstream therapy of eyelid hygiene in the stepwise management approach for blepharitis and dry eye. The studies found in this scoping review highlight the positive effects that lid hygiene can have alone, or in combination with other management options, on improving symptoms and ocular signs. Moreso, the ingredients inherent in some of the more contemporary eyelid hygiene products may be more suitable than baby shampoo, or soap and water alone to curb microbial overgrowth and maintain lid health [44,47,72,73].

Patient education also remains a key part of treatment. It is of the utmost importance to inform patients about the severity and intricacies of their condition, as well as how to use the recommended eyelid cleanser, in order to encourage compliance. For example, patients with Demodex blepharitis may need to be informed of the life cycle of the mite in order to maintain compliance for the recommended amount of time and return for a follow-up assessment. Potential discomfort with any eyelid cleanser, no matter how minor or how transient, should be discussed so that patients know what to expect once they return home [19]. Performing an in-office trial with eyelid cleansers, especially those with TTO, may alleviate some of these concerns.

ECPs too must be attentive to patient's complaints of dry eye or associated symptoms. It has been reported that patients who self-report dry eye symptoms at a first visit, are more likely to be compliant with eyelid hygiene than those who are asymptomatic [74]. Those compliant with eyelid hygiene noted improvement with their symptoms, whereas those who had more longstanding symptoms (several years), tended to have a poorer outcomes with eyelid hygiene [74]. Although that particular study involved older men attending a veteran's hospital clinic, the underlying message is that eyelid hygiene provides relief if patients remain compliant and that DED symptoms should be addressed early on in the management strategy.

This appears to be the first scoping review on eyelid hygiene products. It has several strengths including a robust methodology proposed by Arksey and O'Malley [21] and an evaluation of content retrieved from databases of peer-reviewed literature. Limitations included the search parameters set out in the scoping review. Another limitation with scoping reviews is that it may not necessarily reflect the realities of clinical practice. Since dry eye is a symptomatic disease [75] with patients using a variety of descriptors to identify their ocular discomfort (ie. burning, gritty, stinging, dry, etc), practitioners, have developed recommendations on when to initiate treatment, the regimen, the methods and the choice of lid hygiene product and delivery mechanisms in an attempt to alleviate patient's complaints. However, many of these recommendations are not supported by evidence. Thus, the answer to our study question "What is known in the existing literature on eyelid hygiene products?" is limited, as only 28 studies in the past 70 years were identified by this scoping review. Consequently, this scoping review has identified; 1) a need for more level 1 (randomized, controlled) clinical studies to evaluate eyelid hygiene products, 2) a standardization of lid hygiene procedures (regimen and technique for the different formulations), 3) effect of delivery mechanisms (wipes/pump/gel, etc) on compliance and convenience, etc. These future studies could help guide practitioner recommendations on eyelid hygiene.

6. Conclusion

This review provided a broad overview of the scientific literature available for eyelid hygiene products. There is a need for more high quality clinical studies to evaluate eyelid hygiene products, standardization of methods and procedures to conduct eyelid hygiene, and studies to understand how product design affects compliance in the current literature.

Disclosures

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Declaration of Competing Interest

The authors report no direct conflict of interest with this manuscript.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.clae.2019.09.008>.

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