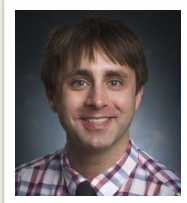


Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Prescribing Lubricating Eye Drops for Common Ocular Conditions

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Lubricating eye drops are commonly self-prescribed by patients for the treatment of ocular discomfort related to various conditions.^{1,2} The maze of available drop options at pharmacies, big box stores, and online sellers makes it exceptionally difficult for patients to navigate the over-the-counter market on their own, which is why eye care providers need to be actively educating patients about lubricating drop options and prescribing specific treatments. This will not only help patients obtain the correct drops, but it will also allow them to avoid self-prescribing drops that contain active ingredients such as pheniramine maleate (redness relievers), which are not aimed at improving ocular comfort and may even make their condition worse due to rebound redness.³ Thus, the purpose of this article is to describe some of the key literature behind lubricating eye drops for the treatment of common ocular discomfort conditions, so eye care practitioners can make appropriate recommendations to patients who have clinically apparent ocular discomfort.

Defining Lubricating Drops

The lubricating eye drop market contains two primary types of topical, over-the-counter drops, which are artificial tears and rewetting drops.¹ The United States' Food and Drug Association (FDA) defines artificial tears in their Ophthalmic Drug Products for Over-the-Counter Human Use monograph as topical eye drops that have a demulcent agent, which is a water-soluble polymer that is applied to the eye to lubricate and protect it, or an emollient agent, which is a fat or oil that prevents the ocular tissue from drying, or it may even soften the treated tissue.^{1,4} Approved emollients include lanolin preparations (anhydrous lanolin, lanolin) and oleaginous ingredients (light mineral oil, mineral oil, paraffin, petrolatum, white ointment, white petrolatum, white wax, yellow wax), while demulcents include cellulose derivatives, dextran 70, gelatin, polyols, polyvinyl alcohol, and povidone.⁴ This same institution defines in-eye contact lens solutions (lubricating and/or rewetting drops) in their Premarket Notification (510(k)) Guidance document for Contact Lens Care Products as a "lens care solution containing one or more active ingredients (e.g., ophthalmic demulcents) in sufficient concentration to alleviate symptoms of discomfort from contact lens wear by a physical means as opposed to a pharmacological action generally associated with OTC in-eye solutions regulated as drugs."⁵ This guidance subsequently indicates that artificial tears are not specifically indicated for use with CLs; however, patients self-prescribe and practitioners frequently recommend artificial tears for patients who have CL discomfort.¹

Evolution of Lubricating Drops

With early artificial tears primarily offered as multi-dosing options, there was a need to prevent microbial bottle contamination and subsequent potential ocular infections. First generation preservatives included thimerosal, chlorhexidine, and benzalkonium chloride (BAK).⁶ While thimerosal and chlorhexidine-containing products have mostly been removed from the market due to their ocular toxicity,⁶ BAK is still present in about 70% of ophthalmic drops.⁷ Early use of harsh preservatives in artificial tears was a likely catalyst for the development of rewetting

drops, which were specifically formulated for use with CLs to assist with comfort. This is important because CLs have the potential to increase the contact time of BAK with the eye, which may increase the potential for ocular toxicity. While the market contains effective rewetting drops, the advent and subsequent incorporation of high molecular weight preservatives, which are less toxic, into artificial tears likely negates the ocular toxicity issues when combining CLs with artificial tears. A recent review article found no evidence of clinically meaningful adverse events with using artificial tears to treat CL patients who have ocular discomfort, yet the author still concluded that when drops are being used more than 4 times per day, it might be best to use a preservative free-drop to avoid any potential toxicities.¹

Historically, preservative free lubricating eye drops only came as single use vials. However, the market now contains new technologies that has allowed for the introduction of preservative free-multi-dose bottles. Pucker et al. recently determined that there was no clear subject preference between unit-dose and multi-dose drops except that participants were more likely to indicate that they thought that the multi-dose bottles were more environmentally friendly.⁸ A full discussion of the preservatives utilized in CL-related solutions is outside the scope of this article, but it can be found in a recent review by Bradley et al.⁶

Artificial Tears for Dry Eye Disease

Estimated to affect up to 50% of the population, dry eye disease is a highly prevalent condition.⁹ It is a multifactorial condition, characterized by both signs and symptoms related to the loss of tear film homeostasis, inflammation, and ocular surface damage.¹⁰ Artificial tears have been classified as step 1 management option by the Tear Film and Ocular Surface Society (TFOS),¹¹ and likely treat dry eye disease by temporarily supplementing the tear film and subsequently improving ocular surface lubrication.¹² With artificial tears having been around for decades, there have been over 40 randomized clinical trials evaluating head-to-head comparisons of a variety of formulations for the treatment of dry eye disease. This extensive literature has been summarized by Pucker and colleagues, who found in a meta-analysis that artificial tears are a safe and effective treatment for dry eye disease, but determined, in general, that there is no clear between-drop differences.¹² The authors conclusions were hampered by poor evidence quality (e.g., inconsistent study designs and outcome measures); thus, additional research is needed to fully understand if prescribers should be suggesting one drop over another.¹²

Lubricating Drops for Contact Lens Discomfort

TFOS has defined CL discomfort as “a condition characterized by episodic or persistent adverse ocular sensations related to lens wear, either with or without visual disturbance, resulting from reduced compatibility between the contact lens and the ocular environment, which can lead to decreased wearing time and discontinuation of contact lens wear.”¹³ CL discomfort affects about 80% of all CL wearers at least occasionally,¹⁴ and it is the primary reason why established CL wearers cease wearing lenses.¹⁵ There is well-developed literature related to artificial tear or rewetting drop use for the treatment of CL discomfort. Lemp et al. conducted one of the first studies evaluating the effectiveness of artificial tears in CL wearers.¹⁶ The authors evaluated 8 participants who were prospectively prescribed bandage CLs for ocular surface disease. BAK-containing artificial tears were also prescribed for up to 40 weeks, and the investigators determined that the drops were effective at improving ocular discomfort while also being safe. Since this study, many others have been performed by authors such as Caffery and Josephson who treated 45 CL wearers with dryness symptoms using 10 different lubricating drops that were randomly assigned for 5 days per drop with a washout period between drops.¹⁷ Interestingly, the authors determined that the participants did not perceive any between-drop differences. Michaud and Frenette pre-treated CLs with a rewetting drop in 61 CL wearers and determined that ocular symptoms improved in most participants.¹⁸ Kading (n = 45) and later Pucker et al. (n = 73) randomized participants either to artificial tears or rewetting drops for two weeks, which were applied to the eye before, during, and after CL use and determined that both types of drops improved ocular comfort, though the authors failed to find one drop provided better comfort than another.^{19, 20} Overall, the literature indicates that lubricating drops are effective at improving comfort

in symptomatic CL wearers, though there is no clear guidance whether one formulation is better than another. Pucker recently provided a full review of this topic.¹

Lubricating Drops for Digital Eye Strain

Digital eye strain, formally known as computer vision syndrome, is characterized by visual and/or ocular discomfort that is directly related to digital device use.²¹ Digital device use can subsequently cause glare, defocus, dryness/discomfort, and ocular fatigue.²¹ The condition may affect more than half of the United States, and is likely on the rise with the world becoming increasingly dependent on digital devices.² With many of the symptoms associated with digital eye strain being dry eye-like, artificial tears are a natural first line treatment. Patients with digital eye strain may experience these symptoms because patients subconsciously decrease their blink frequency when using these devices, which may increase the time tears have to evaporate; this tear depletion can then induce the classic signs and symptoms associated with dry eye disease.^{21, 22} Guillon et al. were one of the first groups to evaluate treating digital eye strain with artificial tears.²³ The authors treated 21 participants with a 2% povidone-based artificial tear using three dosing schedules on different days while participants used a computer for 4 hours; these were compared to the same untreated participants under the same conditions. The authors determined that all three dosing schedules resulted in similar improvements in ocular comfort, but they all significantly reduced digital eye strain symptoms compared to no treatment.²³ Therefore, the authors recommended that patients simply select a dosing schedule that best fits their lifestyle.²³ Reddy et al. later performed a cross-sectional survey of 795 college students with the respondents indicating that they felt artificial tear use was less frequently associated with digital eye strain symptoms.²⁴ Skilling et al. randomized 50 participants to artificial tears or pheniramine maleate, which they were prescribed to use 1 to 2 drops per day for 5 days, with the authors determining that both drops significantly improved ocular symptoms.²⁵ Nevertheless, the two treatments provided similar digital eye strain relief.²⁵ Pucker et al. performed a 2 week study in 30 digital devices users who used digital devices for at least 8 hours per day who were treated with artificial tears 4 or more times per day and found that artificial tears significantly improved their quality of life and dryness symptoms compared to baseline.⁸ These data overall suggests that artificial tears can have a positive impact on digital eye strain, though there is limited evidence suggesting that one formulation of artificial tears is better than another for treating the condition.

Conclusions

Over-the-counter lubricating eye drops are a convenient and economical means for treating some of the most common eye care conditions that result in ocular discomfort. There is currently no clear consensus within the literature that one lubricating eye drop formulation is better than another for any of the conditions discussed in this article. To avoid the potential for drop-related ocular toxicity, formulations containing high molecular weight or no preservatives should be prescribed in frequent use situations. While it is unclear whether one particular lubricating drop is better than another, it is still worthwhile for clinicians to provide specific recommendations to patients to ensure they obtain the correct type, and instruction on instillation at the needed frequency.

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