Effectiveness of Propylene Glycol-hydroxypropyl-guar Nanoemulsion Lubricant Eye Drops in Relieving Watery Eyes Symptom in Subjects with Dry Eye Disease: A Post-marketing, Prospective, Multicenter Study

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INTRODUCTION

- Dry eye disease (DED) is a chronic ocular surface condition characterized by a loss of tear film homeostasis with ocular symptoms such as eye discomfort and visual disturbances; impacting ≥344 million people worldwide and ≥30 million people in the United States (US)[1-3]
- The goal for treating DED is to restore the ocular surface and tear film homeostasis[3]; and the management depends on the severity of symptoms and signs[4]
- The mainstay treatment for DED is artificial tear drops/lubricant eye drops to replenish the aqueous and/or lipid layer of the tear film[4]
- Propylene glycol-hydroxypropyl-guar (PG-HPG) nanoemulsion lubricant eye drops have been found to be safe and effective, in terms of reducing dry eye symptoms in pre-clinical[5,6] and clinical[7-10] studies
- PG-HPG eyedrops are indicated for providing temporary relief of dry eye symptoms (such as burning and irritation) in subjects with DED and of discomfort owing to minor irritations of the eye[11]

Purpose: To evaluate the effectiveness and safety of PG-HPG nanoemulsion lubricant eye drops in relieving the symptom of watery eyes in subjects with DED

METHODS

- A post-marketing, prospective, single-arm study was conducted at 4 sites in the US from November 2021 to March 2022

Eligibility criteria

Inclusion criteria

- Subjects aged ≥18 years with tear break-up time ≤10 seconds for both eyes
- Score of 16–65 on the Impact of Dry Eye on Everyday Living – Symptom Bother (IDEEL-SB) Questionnaire
- Watery eyes symptom score of 1–4 on the Dry Eye Questionnaire-5 (DEQ-5)
- Subjects on cyclosporine or other topical dry eye medications must have been on stable dosing regimen for ≥60 days prior to enrollment
- Subjects reporting symptoms of burning, stinging, sore and tired eyes as on the IDEEL-SB Questionnaire.

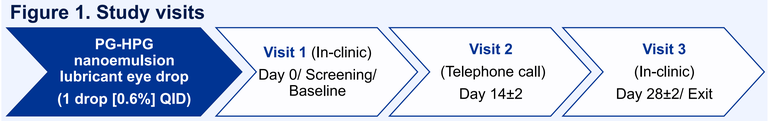
Exclusion criteria

- Using punctal plugs or punctal occlusion
- Clinically significant corneal scarring, corneal degeneration and/or dystrophy, blepharitis in either eye, or meibomian gland disease, as determined by investigators
- Contact lens use within 1 week, or on any systemic medications known to cause dry eye ≤1 month before screening

Instillation of eye drops

- On day 0, subjects received the first dose of PG-HPG nanoemulsion lubricant eye drops and were required to self-administer one drop (0.6%) 4 times daily for 28±2 days **(Figure 1)**
- Subjects completed DEQ-5 questionnaire on their electronic device on day 0, day 14±2 and day 28±2

Figure 1. Study visits



Study endpoints

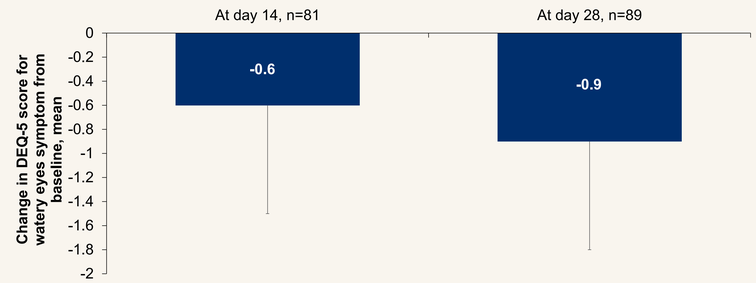
- Change in watery eyes symptom from baseline to day 28, evaluated by DEQ-5 scale (0=never; 1=rarely; 2=sometimes; 3=frequently; and 4=constantly)
- Watery eyes symptom relief was also assessed using the Likert questionnaire (5-point scale: strongly agree to strongly disagree) at day 28
- Safety outcomes: adverse events reported throughout the study period

Statistical analysis

- Safety analysis set included subjects who received ≥1 dose of eye drops; and per-protocol (PP) analysis set included subjects who met inclusion criteria, and completed the study
- All statistical analyses were performed using SAS® software v9.4 (SAS Institute Inc., Cary, NC)
- Data were presented either as categorical variables (counts and percentages) or continuous variables (mean and standard deviation [SD])

RESULTS

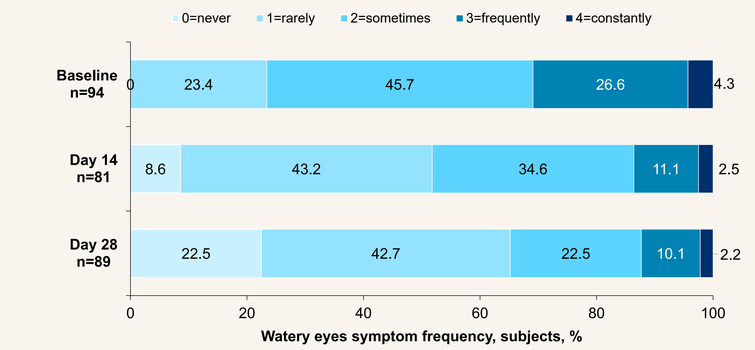
Figure 3. Change in DEQ-5 score for watery eyes symptom from baseline



Error bars represent standard deviation.

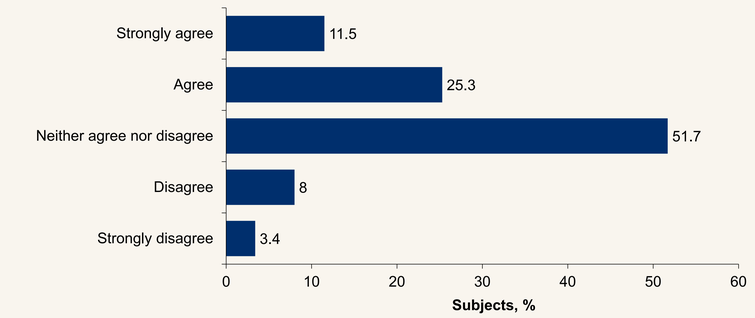
- The DEQ-5 score for symptom of watery eyes significantly improved from baseline to day 14 and day 28 (mean±SD: -0.6±0.9 and -0.9±1.0, respectively; p<0.0001 for both) **(Figure 3)**

Figure 4. Watery eyes symptom frequency on DEQ-5 scale



- On DEQ-5 scale, proportion of subjects with scores of 2 to 4 for watery eyes symptom reduced from baseline (76.6%) to day 14 (48.2%) and day 28 (34.8%) **(Figure 4)**

Figure 5. Subjects reporting relief from watery eyes symptom on the Likert scale at Day 28

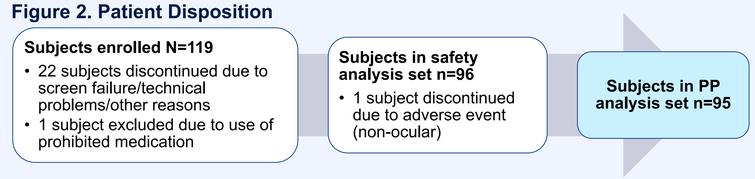


- On day 28, 36.8% of subjects "agreed"/ "strongly agreed" on having experienced relief from symptoms of watery eyes **(Figure 5)**

RESULTS

- In total, 119 subjects were enrolled at 4 study sites
  - Among these subjects, 96 subjects were included in the safety analysis set, and 95 were included in PP analysis set **(Figure 2)**

Figure 2. Patient Disposition



- In PP analysis set, mean±SD age of 95 subjects was 61.2±13.0 years, with the majority being female (69.5%), White racial background (94.7%), and not Hispanic or Latino ethnicity (95.8%) **(Table 1)**

Table 1. Demographics at baseline/day 0

Characteristics	Overall (n=95)
Age, mean±SD years	61.2±13.0
Gender, n (%)	
Female	66 (69.5)
Male	29 (30.5)
Race, n (%)	
White	90 (94.7)
Black or African American	1 (1.1)
American Indian or Alaska Native	1 (1.1)
Asian	1 (1.1)
Multiple races	1 (1.1)
Not reported	1 (1.1)
Ethnicity, n (%)	
Hispanic or Latino	4 (4.2)
Not Hispanic or Latino	91 (95.8)

- Of the 96 subjects in the safety analysis set, 3 subjects (3.1%) reported adverse events (non-ocular; infections and infestations) **(Table 2)**

Table 2. Adverse events reported by subjects

	Events	All subjects (n=96)
Adverse events	3	3 (3.1)
Treatment emergent adverse events*	3	3 (3.1)
Causality of Treatment emergent adverse events		
Related	0	0 (0.0)
Not related	3	3 (3.1)
Covid-19	1	1 (1.0)
Herpes Zoster	1	1 (1.0)
Kidney infection	1	1 (1.0)
Serious adverse events	1	1 (1.0)
Kidney infection	1	1 (1.0)

*There was no difference between adverse events and treatment-emergent adverse events.

CONCLUSION

The PG-HPG nanoemulsion lubricant eye drop is safe and effective in relieving the symptom of watery eyes in subjects with DED, over a period of 28 days

Abbreviations: DED, dry eye disease; DEQ-5, dry eye questionnaire-5; IDEEL-SB, impact of dry eye on everyday living-symptom bother questionnaire; PG-HPG, propylene glycol-hydroxypropyl guar; PP, per-protocol; QID, four times in a day; SD, standard deviation.

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Conflict of interest: Lakshman Subbaraman and Deborah Awisi-Gyau are employees of Alcon. Jason Miller and Katherine Bickle are clinical investigators for Alcon.

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