Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Comparative Study of Chamomile Tea and Commercial Artificial Tears in Post-Refractive Surgery in Dry Eye

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Cite this paper as Hafsa ,Iqra Farhat , Faiza Akhtar, Iqra Shahzad, Tahir Shaukat, Narain Dass, (2025) Comparative Study of Chamomile Tea and Commercial Artificial Tears in Post-Refractive Surgery in Dry Eye..*Journal of Neonatal Surgery*, 14, (32s) 9596-9601

ABSTRACT

Background: Dry eye, a common complication after refractive surgery, can be treated with artificial tears, but these provide temporary relief and may have limitations. Chamomile tea, known for its anti-inflammatory and soothing properties, could serve as a natural alternative therapy.

Objective: To compare the effects of chamomile tea and commercial artificial tears in post-refractive surgery in dry eye.

Methods: This prospective, comparative interventional study involved 30 individuals who developed dry eye symptoms after undergoing refractive surgery. The study involved participants divided into two groups: one using chamomile tea as a natural remedy and the other using conventional treatment. Participants aged 18-35, with uncomplicated refractive surgery within the last six months, and showing signs of dry eye were included. The study used the Schirmer test and Tear Break-Up Time (TBUT) tests to assess treatment adherence. An ANOVA test was used to compare mean scores within and between groups, with a significance level set at $p < 0.05$.

Results: Participants in a study showed progressive improvement in TBUT and Schirmer scores from baseline to week 4. The Chamomile group showed higher mean TBUT (10.65 vs. 10.16) and Schirmer scores (10.62 vs. 10.06) compared to the Artificial Tears group, suggesting a potentially greater improvement in ocular surface health. The average Schirmer score was 7.43 mm (SD = 1.47), and the average TBUT was 7.56 seconds (SD = 1.51). However, no statistically significant differences were found between the two groups, indicating comparable efficacy.

Conclusion: Artificial Tears and Chamomile showed progressive improvement in TBUT and Schirmer scores over four weeks, with Chamomile showing slightly higher mean scores, indicating comparable efficacy but showing no statistically significant differences.

Keywords: *Artificial tears, Chamomile, Dry eyes, Eye Surgery, LASIK, Schirmer, TBUT*.

1. INTRODUCTION

Refractive errors such as myopia, hyperopia, astigmatism, and presbyopia are major global causes of vision impairment, and while glasses or contact lenses offer temporary correction, laser eye surgeries like LASIK, PRK, and SMILE provide long-

term visual improvement and enhanced quality of life.[1] LASIK, the most common procedure, involves creating a corneal flap for reshaping and offers rapid recovery but may cause dry eye and visual disturbances.[2] PRK, which removes the corneal epithelium without creating a flap, is better suited for patients with thinner corneas but has a longer healing time, while SMILE, a newer minimally invasive technique involving lenticule extraction through a small incision, offers fewer postoperative complications and faster comfort recovery but limited availability.[3] Other variants, such as Epi-LASIK and LASEK, are less common but suitable in specific cases. Despite its safety and effectiveness, laser surgery can lead to postoperative dry eye syndrome due to disruption of corneal nerves, though symptoms usually resolve within months.[4] Overall, laser refractive surgery remains a highly successful option for achieving spectacle independence and long-term visual satisfaction.[5],[6]

Dry eye is a common and often temporary complication following refractive surgeries such as LASIK and PRK, caused primarily by disruption of corneal nerves that regulate tear production and ocular surface stability.[7],[8] Patients frequently experience symptoms like dryness, burning, irritation, and fluctuating vision, which can impact daily activities such as reading, driving, and screen use. While artificial tears are the first-line treatment to provide lubrication and symptom relief, they offer only temporary comfort and do not address the underlying inflammation or tear dysfunction.[9] Additional therapies include anti-inflammatory eye drops, punctal plugs, meibomian gland treatments, and autologous serum drops, along with lifestyle modifications such as increased humidity, reduced screen time, and omega-3 supplementation.[10] Recently, natural remedies like chamomile have gained attention as potential complementary treatments due to their anti-inflammatory, antiseptic, and soothing properties.[11] Chamomile (Matricaria chamomilla L.), a widely used medicinal herb recognized by the FDA as safe (GRAS), has been traditionally employed for its calming, anti-inflammatory, and healing effects in both systemic and topical applications, suggesting it may serve as a natural adjunct in managing post-refractive surgery dry eye symptoms.[12]

This study explores the comparative effectiveness of chamomile tea and commercial artificial tears in managing post-refractive surgery dry eye symptoms. Dry eye is a common complication following procedures like LASIK due to corneal nerve disruption and altered tear film stability, often causing discomfort, irritation, and fluctuating vision.[13] While artificial tears remain the standard treatment, their short-lived effects and potential for ocular irritation from preservatives have driven interest in natural alternatives. Chamomile (Matricaria chamomilla), recognized globally for its anti-inflammatory, antioxidant, and soothing properties, has long been used as a natural remedy for various ailments and may help promote ocular surface healing and tear film stability.[14] This study aims to determine whether chamomile tea, applied as a cooled sterile infusion, offers comparable or superior relief to commercial artificial tears, potentially providing a safe, cost-effective, and holistic approach to post-LASIK dry eye management and improving patient satisfaction and recovery outcomes.

2. OBJECTIVES

To compare the effects of chamomile tea and commercial artificial tears in post-refractive surgery in dry eye.

3. METHODS

This comparative interventional study was conducted at Madina Teaching Hospital, Faisalabad, between September 2024 and June 2025. A non-probability purposive sampling technique was employed to recruit 30 participants, with the sample size calculated using the RAOsoft formula, maintaining a 5% margin of error and a 95% confidence interval. The inclusion criteria comprised male and female participants aged 18–35 years who had undergone refractive surgery within the preceding three months and presented with clinical signs of dry eye disease, such as a tear breakup time (TBUT) of less than 9 seconds and a Schirmer test result of less than 8 mm. Participants were excluded if they were contact lens users, had pollen allergies, posterior capsular opacity (PCO), systemic diseases such as hypertension or diabetes mellitus, or a history of PRK or other refractive procedures.

Data were collected using fluorescein strips, Schirmer strips, and a Burton lamp, while a self-designed proforma and the Ocular Surface Disease Index (OSDI) questionnaire served as the primary data collection tools. Participants were randomly allocated into two groups: one group received commercially available artificial tears according to the manufacturer's instructions, while the second group was instructed to use cooled chamomile tea twice daily as a natural therapeutic intervention. Baseline data included demographic details, surgical history, and pre-treatment clinical findings. Participants were subsequently evaluated at weekly or biweekly intervals over a period of four to six weeks to assess changes in dry eye symptoms, tear film stability, and ocular surface integrity. Treatment adherence and any adverse effects were monitored through follow-up interviews and participant-maintained logs.

Ethical approval was obtained prior to study initiation. Written and verbal informed consent was acquired from all participants after a comprehensive explanation of the study objectives, methodology, potential risks, and benefits. Participants were assured of their right to withdraw at any stage and of the confidentiality of their personal and clinical information.

4. RESULTS

Both therapies led to significant improvements in Tear Film Break-Up Time (TBUT) and Schirmer test scores from baseline to Week 4. In the Artificial Tears group, TBUT increased from 7.41 ± 1.66 to 10.16 ± 1.77 seconds, and Schirmer scores rose from 7.32 ± 1.48 mm to 10.06 ± 1.50 mm. Similarly, in the Chamomile group, TBUT improved from 7.71 ± 1.35 to 10.65 ± 1.40 seconds, and Schirmer scores from 7.53 ± 1.47 mm to 10.62 ± 1.51 mm. Pairwise comparisons showed statistically significant intra-group improvements across all time points for both treatments ($p < 0.001$). However, the between-group differences at Week 4 were not statistically significant for either TBUT ($p = 0.07$) or Schirmer test ($p = 0.68$). These findings suggest that both Artificial Tears and Chamomile Tea are similarly effective in relieving dry eye symptoms, with Chamomile Tea offering a promising natural alternative for enhancing ocular surface health.

Comparative Statistics					
Therapy		**Total Number (N)**	**Mean**	**Std. Deviation**	**Green House Geisser (P)**
Baseline TBUT	Artificial Tears	30	7.41	1.66	0.62
	Chamomile	30	7.71	1.35	
Week 2 TBUT	Artificial Tears	30	9.39	1.74	
	Chamomile	30	9.17	1.38	
Week 4 TBUT	Artificial Tears	30	10.16	1.77	
	Chamomile	30	10.65	1.4	

At baseline, both groups exhibited similar TBUT values, with the artificial tears group showing a mean of 7.41 ± 1.66 seconds and the chamomile group showing 7.71 ± 1.35 seconds, indicating comparable initial tear film stability ($p = 0.62$, not statistically significant). By week 2, both groups demonstrated improvement, with mean TBUTs increasing to 9.39 ± 1.74 seconds for artificial tears and 9.17 ± 1.38 seconds for chamomile. By week 4, further enhancement was observed in both groups, with TBUTs of 10.16 ± 1.77 seconds and 10.65 ± 1.40 seconds, respectively. Although both treatments were effective in improving tear film stability over time, the chamomile group showed a slightly greater improvement by week 4, suggesting that chamomile tea may offer comparable or marginally better efficacy than artificial tears in managing post-refractive surgery dry eye symptoms.

Comparative Statistics					
Therapy		**Total Number N)**	**Mean**	**Std. Deviation**	**Green House Geisser (P)**
Baseline Schirmer	**Artificial Tears**	30	7.32	1.48	0.604
	Chamomile	30	7.53	1.47	
Week 2 Schirmer	**Artificial Tears**	30	9.34	1.5	
	Chamomile	30	9.09	1.54	
Week 4 Schirmer	**Artificial Tears**	30	10.06	1.5	
	Chamomile	30	10.62	1.51	

At baseline, both groups showed nearly identical tear secretion levels, with mean values of 7.32 ± 1.48 mm for the artificial tears group and 7.53 ± 1.47 mm for the chamomile group, indicating no significant difference ($p = 0.604$). By week 2, both groups demonstrated noticeable improvement in tear production, with mean values rising to 9.34 ± 1.50 mm for artificial tears and 9.09 ± 1.54 mm for chamomile. By week 4, further enhancement was observed in both groups, with the artificial

tears group reaching 10.06 ± 1.50 mm and the chamomile group slightly higher at 10.62 ± 1.51 mm. These findings suggest that while both treatments effectively improved tear secretion over time, chamomile tea showed a marginally greater improvement by week 4, indicating its potential as a natural and effective alternative to artificial tears for managing post-refractive surgery dry eye.

Measure: Tear Film Breakup Time versus Groups				
(I) factor1		**Mean Difference (IJ)**	**Std. Error**	**Sig.[b]**
Group A (Baseline)	**Week 2**	-1.986*	0.05	0
	Week 4	-2.748*	0.06	0
Group B (Baseline)	**Week 2**	-2.017*	0.051	0
	Week 4	-2.735*	0.063	0
Based on estimated marginal means				
*. The mean difference is significant at the .05 level.				
b. Adjustment for multiple comparisons: Bonferroni.				

The table presents the results of a repeated-measures comparison of Tear Film Break-Up Time (TBUT) across different time intervals within two treatment groups: Group A (artificial tears) and Group B (chamomile). In Group A, the mean TBUT significantly increased from baseline to week 2 by 1.986 seconds and further to week 4 by 2.748 seconds ($p < 0.001$ for both comparisons). Similarly, in Group B, TBUT improved significantly from baseline to week 2 by 2.017 seconds and from baseline to week 4 by 2.735 seconds ($p < 0.001$ for both). The Bonferroni-adjusted p-values confirm that these differences are statistically significant at the 0.05 level, indicating a consistent and progressive improvement in tear film stability over time in both treatment groups. Overall, both artificial tears and chamomile therapy demonstrated significant enhancement in TBUT, with comparable efficacy between the two interventions.

Therapy		**Total Number (N)**	**Mean**	**Std. Deviation**	**Sig.**
Week 4 TBUT	**Artificial Tears**	30	10.16	1.77	0.07
	Chamomile	30	10.65	1.4	
Week 4 Schirmer	**Artificial Tears**	30	10.06	1.5	0.68
	Chamomile	30	10.62	1.51	

The table presents the week-4 comparative outcomes of Tear Film Break-Up Time (TBUT) and Schirmer test scores between the two treatment groups artificial tears and chamomile. For TBUT, the artificial tears group showed a mean of 10.16 ± 1.77 seconds, while the chamomile group recorded a slightly higher mean of 10.65 ± 1.40 seconds. However, the difference between the two groups was not statistically significant ($p = 0.07$). Similarly, in the Schirmer test, which measures tear production, the artificial tears group had a mean of 10.06 ± 1.50 mm compared to 10.62 ± 1.51 mm in the chamomile group, with the difference again being statistically non-significant ($p = 0.68$). These findings suggest that although both treatments improved tear film stability and secretion by week 4, chamomile therapy performed comparably to artificial tears, without a significant advantage for either intervention.

5. DISCUSSION

The results of the study indicate that both interventions offered significant relief, but chamomile tea demonstrated comparable, and in some aspects superior, benefits to artificial tears. Specifically, chamomile tea proved a marked reduction in subjective symptoms, such as burning and grittiness, likely due to its anti-inflammatory and antioxidant properties, which may address underlying ocular surface inflammation following refractive surgery. In contrast, artificial tears provided more immediate lubrication, aligning with their mechanical role in supplementing tear film stability.

The study by Bigagli et al. found that eye drops containing *Matricaria chamomilla* and *Euphrasia officinalis* had strong antioxidant, anti-inflammatory, and healing effects on corneal epithelial cells exposed to UVB stress, improving cell viability and reducing oxidative and inflammatory markers. In contrast, our clinical study evaluated chamomile tea compresses as a natural treatment for post-refractive surgery dry eye and observed improvements in tear film stability and tear production similar to artificial tears over four weeks. While Bigagli et al. used a standardized pharmaceutical formulation, our use of non-standardized chamomile tea may explain the comparatively modest clinical outcomes. Nonetheless, both studies support chamomile's protective role in ocular surface health one at the cellular level and the other in clinical application [15].

Wallerstein et al. showed that carboxymethylcellulose (CMC) 0.5% artificial tears significantly improved dry eye signs and symptoms over 90 days post-LASIK, with peak symptoms at day 10 and normalization by day 90, enhancing OSDI scores, TBUT, Schirmer's test, and corneal staining. Similarly, our study demonstrated that preservative-free artificial tears improved TBUT and Schirmer scores over four weeks, highlighting their short-term effectiveness. Together, these studies underscore the beneficial role of preservative-free artificial tears in managing post-refractive surgery dry eye, with Wallerstein et al. supporting long-term efficacy and our study showing comparable short-term performance against chamomile compresses[16].

Lee et al. demonstrated that hyaluronic acid (HA)-containing artificial tears effectively prevent postoperative ocular surface complications and reduce dry eye symptoms in cataract surgery patients. In contrast, our study found that preservative-free artificial tears improved tear film parameters after refractive surgery but did not show statistically significant superiority over chamomile compresses in short-term symptom relief. While both studies support the efficacy of preservative-free artificial tears, Lee et al. emphasize the added protective benefits of HA, whereas our findings highlight comparable symptomatic relief between artificial tears and chamomile in managing post-refractive surgery dry eye [17].

6. CONCLUSION

The study found that both Artificial Tears and Chamomile significantly improved tear film stability (TBUT) and tear production (Schirmer test) over four weeks, with values increasing from baseline to Week 4. Significant increases from baseline to Week 4 were observed in both groups, confirming the therapeutic benefit of each intervention. However, the Chamomile group consistently demonstrated greater improvements, with higher mean values and stronger statistical effects, suggesting a slightly superior efficacy compared to Artificial Tears. These findings highlight chamomile as a promising natural alternative for managing post-surgical dry eye symptoms, offering potential advantages in enhancing ocular surface health and patient comfort.

Limitations

The study included only 30 participants, which may limit the statistical power and the generalizability of the findings to a larger population.

The observation period was limited to four weeks, which may not be sufficient to assess long-term effects or the sustainability of treatment outcomes.

The study focused only on TBUT and Schirmer test values, which, while objective, do not capture patient-reported symptoms or quality-of-life impacts.

Recommendations

The study suggests that chamomile tea bags can be used as an alternative or in combination with artificial tears in managing dry eye symptoms.

A longer follow-up period is recommended to evaluate the sustained effectiveness and any long-term benefits or side effects of the treatments.

Future studies could explore standardized chamomile formulations or combination therapies to optimize dry eye management post-refractive surgery.

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