Archives of Current Medical Research
Arch Curr Med Res 2025; 6(3): 173-181

Received: 29 January 2025
Revised: 24 April 2025
Accepted: 02 May 2025
DOI: 10.47482/acmr.1629439

ORIGINAL ARTICLE

The Use of Polyvinyl Alcohol & Povidone During The Preoperative and Postoperative Management of Phacoemulsification

Ceren Türkoğlu[1]

1 Lokman Hekim University, Faculty of Medicine, Department of Ophthalmology, Ankara, Türkiye

Abstract

Background: To investigate the effect of regular application of polyvinyl alcohol & povidone eye drops during the perioperative period in patients undergoing phacoemulsification on the signs and symptoms of dry eye syndrome developing secondary to phacoemulsification.

Methods: Patients who underwent phacoemulsification due to senile cataract were examined in two separate groups: Patients followed with topical moxifloxacin, prednisolone and polyvinyl alcohol & povidone eye drops, Group I , patients followed with topical moxifloxacin and prednisolone, Group II was separated as.

Results: According to the results obtained from the study, the data vary. Of the patients included in the study (n = 104 patients), 50% were female and 50% were male, and their average age was 59.83 ± 5.33. In Group I, there was an increase in TBUT and Schirmer I values in the postoperative period ($p < 0.05$), while there was a decrease in the Oxford grading scale ($p < 0.05$). On the other hand, in Group II, while TBUT decreased in the postoperative period ($p < 0.05$), an increase in Oxford grading scale was detected ($p < 0.05$).

Conclusion: Considering the perioperative period of phacoemulsification surgery, it was observed that the use of polyvinyl alcohol & povidone eye drops contributed positively to dry eye findings. Moreover, the use of preoperative artificial tears is extremely important for the prevention of postoperative dry eye syndrome, which reduces the risk of infection and thus maintaining healthy homeostasis of the anterior segment.

Keywords: Dry eye syndrome, eye drops, tear break-up time, schirmer, oxford grading scale

Corresponding Author:
Ceren Türkoğlu, MD, Department of Ophthalmology, Lokman Hekim University Faculty of Medicine, Ankara, Türkiye
E-mail: dr.cerenturkoglu@gmail.com

INTRODUCTION

Senile cataract is a common cause of treatable low vision in several developed countries. Phacoemulsification, which is now considered the first choice in senile cataract treatment, provides a rapid postoperative recovery process and less risk of complications. On the other hand, phacoemulsification can cause dry eye syndrome (DES) by causing meibomian gland dysfunction and tear film instability and is described as a temporary disorder of the ocular surface(1, 2). During this period, dry eye symptoms may be observed in patients (burning, stinging, foreign body sensation, redness, reflex tearing, dryness sensation). Additionally, it is reported in the literature that DES symptoms and signs decrease within 1-3 months after phacoemulsification (2).

Although phacoemulsification, a modern small incision cataract surgery procedure, offers rapid postoperative recovery, low risk of complications, and good clinical outcomes, its harmful effects on the ocular surface can both cause DES and increase pre-existing DES. In addition to being important in terms of DES symptomatology, this situation is also important in terms of increasing the risk of infection, affecting the optimization of preoperative evaluation (topography, tonometry and biometric measurements, surgical planning) and causing fluctuation in postoperative visual performance (3, 4)

It is known that DES symptoms cause discomfort in the postoperative period in patients who underwent preoperative and postoperative phacoemulsification, caused by the combination of phacoemulsification and DES. In conclusion, this study holds significant importance in understanding the role of polyvinyl alcohol & povidone eye drops in the management of DES following phacoemulsification surgery. By evaluating the impact of these eye drops during both the preoperative and postoperative periods, the research provides valuable insights into how artificial tears can mitigate the discomfort associated with DES, improve ocular surface health, and enhance the overall postoperative recovery experience for patients. Given the high prevalence of DES in cataract surgery patients, this study contributes to the growing body of evidence supporting the use of polyvinyl alcohol & povidone eye drops as a practical, effective solution for managing this common complication. Moreover, the findings emphasize the importance of preemptive management in preventing the exacerbation of dry eye symptoms, thereby improving the long-term outcomes of cataract surgery and enhancing patient satisfaction.

MATERIALS AND METHODS

This is a prospective, interventional, single-center study. Adhering to the principles of the Declaration of Helsinki, it was approved by Nigde Omer Halisdemir University Local Ethics Committee (Approval No: 2022/58, Date: 09.06.2022) This study was conducted as a prospective interventional study in the Ophthalmology clinic over a 3-month period after the approval of the institutional ethics committee. The data collection process for this study continued between May 2022 and March 2023. The statistical analyses of the study were conducted through SPSS (SPSS version 26.0; SPSS, Inc., Chicago, IL, USA). Male and female patients, aged 40-70, with age-related cataracts and without any other ocular disease, were included in the study after written informed consent was obtained.

During the preoperative phase, patients were administered 10 mg/ml tropicamide (Tropamid 1% Forte, Bilim Pharmaceuticals, Turkey), 25 mg/ml phenylephrine (Mydfrin 2.5%, 5 ml, Alcon, Friborg, Switzerland) in three separate doses, with a 45-minute interval between each application. Cyclopentolate hydrochloride (Cycloplegin 1%, Abdi İbrahim, Turkey) eye drops were also applied. Local anesthesia which was administered by injecting a small volume of lidocaine (0.1-0.5 mL) into the anterior chamber. was subsequently administered. Clear corneal incisions measuring 1.8 mm were made at the 3 o'clock and 9 o'clock positions. Pupil dilation was achieved by instilling a mixture of 0.2 ml adrenaline (1 mg/ml), 0.2 ml lidocaine (Jetokain Simplex 20 mg/ml, ADEKA, Turkey), and 0.1 ml balanced salt solution (BSS), depending on the surgeon's preference and the required intracameral anesthesia (5, 6).

The procedure began with the creation of a capsular flap using a cystotome, followed by completion of the capsulorhexis with microforceps. A main incision of 2.4 mm was then made at the 12 o'clock position. Hydrodissection and hydrodelination were performed through this main incision, followed by monitoring of the lens movement, which was emulsified via phacoemulsification. Ophthalmic viscoelastic material was subsequently injected into the capsule, and the lens was implanted through the main incision, which was expanded to 2.8 mm using a blade. After the removal of the viscoelas-

tic material, 0.1 cc of cefuroxime (Aprokam 50 mg, Thea Pharma, Clermont-Ferrand, France) was injected into the anterior chamber. Finally, the incisions were closed using stromal hydration, and the procedure was completed with a subconjunctival injection of dexamethasone (Dekort 8 mg/2 ml, Deva, Turkey) (5, 6).

In the postoperative period, all patients were treated with topical moxifloxacin (Moxai 0.5%, Abdi Ibrahim Ilac, Istanbul, Turkey) and topical prednisolone (Pred Forte 1%, Allergan INC, Dublin, Ireland) four times daily. Patients were instructed to allow 10 minutes between each drop as recommended for proper absorption and to avoid potential interactions between different medications (7). Specifically, moxifloxacin was used for 1 week postoperatively, and prednisolone was used for 2 weeks, with gradual tapering during the second week. Polyvinyl alcohol 1.4% &povidone 0.6% (Refresh, Allergan, Texas, USA) tear drops were started four times a day in 52 of the patients two weeks before phacoemulsification and continued for three months postoperatively. On the other hand, 52 patients were followed up without using artificial tear drops. The patients who were followed with topical moxifloxacin, prednisolone and polyvinyl alcohol & povidone eye drops were called Group I (n= 52 patients), and the patients who were followed with topical moxifloxacin and prednisolone were called Group II (n = 52 patients).

Participants included in the study were visited preoperatively and in month 1 and 3 postoperatively. Best-corrected visual acuity (BCVA) and biomicroscopic detailed anterior segment evaluation were performed during each visit. Ocular Surface Disease Index (OSDI), fluorescein tear break-up time (TBUT) and Schirmer I test were performed to evaluate dry eye symptoms during each visit. Additionally, ocular surface staining with fluorescein staining was evaluated using the Oxford grading scale.

The inclusion criteria for the study were between the ages of 45-70, having nuclear, cortical and/or posterior subcapsular cataracts between stages 2-5 according to The Lens Opacities Classification System III and having stage 2-3 dry eye disease according to the Tear Film and Ocular Surface Society's 'Dry eye severity grading scheme'. Exclusion criteria from the study were a diagnosis of any chronic disease (diabetes, hypertension, etc.), and those having undergone ocular surgery, as well as having any eye disease other than cataract. Once eligible patients were identified, randomization was applied to ensure unbiased allocation into two groups. A computer-generated randomization list was used to assign patients to either Group I or Group II, helping to minimize selection bias and maintain the focus on individuals who met the necessary criteria for the study.

Statistical analysis was performed by means of Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois, USA) version 23. To determine the difference between two independent variables, parametric tests were applied for normally distributed data and nonparametric tests were applied for non-normally distributed data. To determine the variable between two independents, the independent t test was conducted for normally distributed data, and the Mann-Whitney U test was conducted for non-normally distributed data. Statistical significance was determined as $P < 0.05$.

RESULTS

According to the results obtained from the study, the data vary. In that, the patients included in the study were 52 (50%) female and 52 (50%) were male, and their average age was 59.83 ± 5.33 (43-67) years. Demographic data by groups are given in Table I. Considering the surgical success of the study, no perioperative complications were detected in any patient during the

Table 1. Demographic data of participants

Features	Participants (n =1 04)	Group I (n = 52)	Group II (n = 52)	*p*
Age	59.83 ± 5.33 (43 - 67)	59.88 ± 5.29 (43 - 67)	59.77 ± 5.42 (49 - 65)	0.9
Sex (female / male)	50 / 50 % (n = 52 / 52)	51.9 / 48.1 % (n = 27 / 25)	48.1 / 51.9 % (n = 25 / 27)	0.6

Values are presented as number or mean and standard deviation.

phacoemulsification surgery and the surgery time was between 20-30 minutes.

Considering preoperative dry eye findings, when Groups I and II were compared, a significant difference was found between Oxford rating scale ($p = 0.05$). When it comes to TBUT, Schirmer I test and OSDI values, no significant difference was detected between Groups I and II ($p = 0.08$, 0.5, 0.2, respectively). The participants' objective (TBUT, Schirmer I and Oxford grading scale) and subjective (OSDI) values for dry eye are given in Figure I.

When Groups I and II are considered separately, the results are summarized as follows. The preoperative (before starting artificial tear drops) dry eye findings of all patients and the postoperative 1st and 3rd month findings were compared according to the groups. When Group I and II were considered separately, the results are summarized as follows.

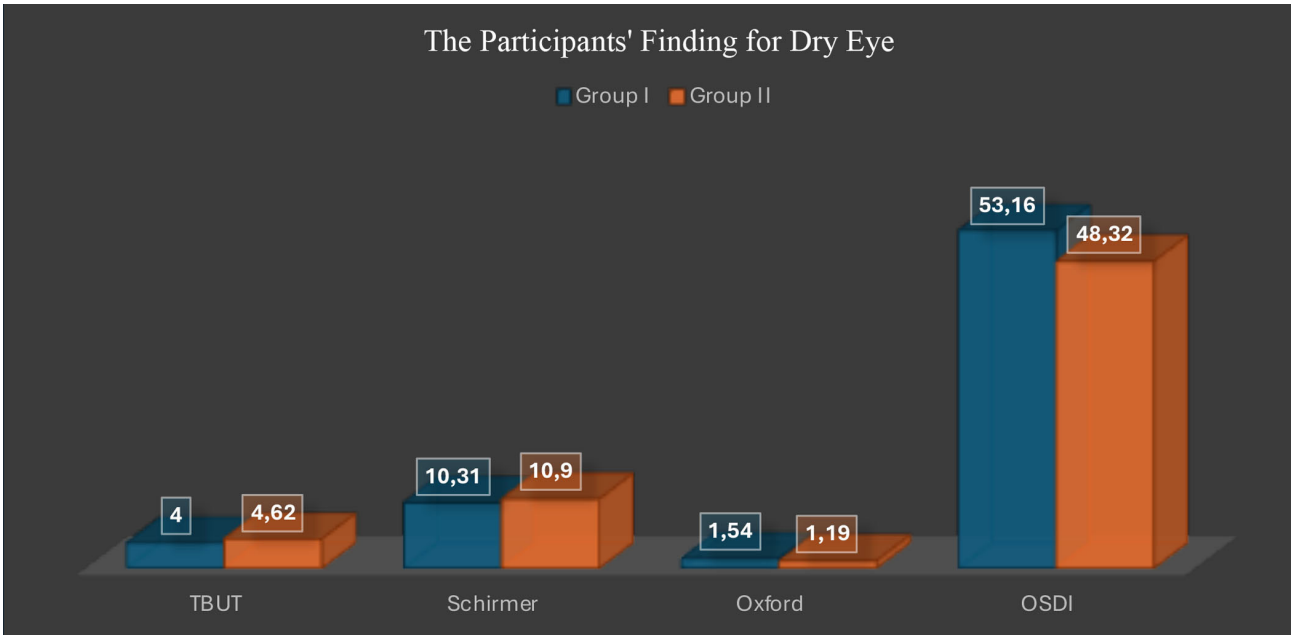

Figure 1: The participants' preoperative objective (TBUT, Schirmer I and Oxford grading scale) and subjective (OSDI) values for dry eye

There was no significant difference in the TBUT values of the participants in Group I between preoperative and postoperative first month 1 ($p = 0.63$). On the other hand, a significant difference was detected in all other parameters examined (TBUT, Schirmer I, Oxford Grading Scale and OSDI) ($p < 0.05$). The data are given in Table II.

There was no significant difference in the Schirmer I values of the participants in Group II between preoperative and postoperative month 1 and preoperative and postoperative month 3 ($p = 0.38$, 0.28, respectively). On the other hand, a significant difference was detected between preoperative - postoperative month 1 and preoperative - postoperative month 3 values in all parameters examined (TBUT, Schirmer I, Oxford Grading Scale and OSDI) ($p < 0.05$). The data are given in Table III. On the other hand, there was a significant difference between the preoperative and postoperative values in all other parameters examined (TBUT, Oxford Grading Scale and OSDI) ($p<0.05$). The data are given in Table III.

Three-month changes in objective criteria (TBUT, Schirmer I and Oxford grading scale) of patients in group I and II are given in Figures II and III.

Table 2. Changes in objective (TBUT, Schirmer I test, Oxford Grading Scale) and subjective (OSDI) values of participants in Group I over time

Variables	Data	*p*
TBUT (preop) / TBUT (month-1)	4.00 ± 1.99 / 3.85 ± 1.66 sec.	0.63
TBUT (preop) / TBUT (month-3)	4.00 ± 1.99 / 4.67 ± 1.61 sec.	0.04
Schirmer I (preop) / Schirmer (month-1)	10.31 ± 5.61 / 13.12 ± 4.92 mm	< 0.001*
Schirmer I (preop) / Schirmer (month-3)	10.31 ± 5.61 / 12.31 ± 5.08 mm	0.003
Oxford Grading Scale (preop) / Oxford Grading Scale (month-1)	1.54 ± 0.64 / 2.69 ± 1.28	< 0.001*
Oxford Grading Scale (preop) / Oxford Grading Scale (month-3)	1.54 ± 0.64 / 1.87 ± 0.56	< 0.001*
OSDI (preop) / OSDI (month-1)	53.16 ± 17.95 / 30.59 ± 21.24	< 0.001*
OSDI (preop) / OSDI (month-3)	53.16 ± 17.95 / 25.25 ± 17.47	< 0.001*

Paired Samples Test. Values are presented as number or mean and standard deviation. Preop = preoperative, sec.: seconds, mm: millimeter, $p < 0.001$ = *.

Table 3. Changes in objective (TBUT, Schirmer I test, Oxford Grading Scale) and subjective (OSDI) values of participants in Group II over time

Variables	Data	*p*
TBUT (preop) / TBUT (month-1)	4.62 ± 1.54 / 3.23 ± 1.42 sec.	< 0.001*
TBUT (preop) / TBUT (month-3)	4.62 ± 1.54 / 3.80 ± 1.68 sec.	0.007
Schirmer I (preop) / Schirmer (month-1)	10.90 ± 5.10 / 11.52 ± 4.76 mm	0.38
Schirmer I (preop) / Schirmer (month-3)	10.90 ± 5.10 / 11.67 ± 5.54 mm	0.28
Oxford Grading Scale (preop) / Oxford Grading Scale (month-1)	1.19 ± 0.60 / 1.90 ± 0.60	< 0.001*
Oxford Grading Scale (preop) / Oxford Grading Scale (month-3)	1.19 ± 0.60 / 2.00 ± 0.59	< 0.001*
OSDI (preop) / OSDI (month-1)	48.32 ± 24.51 / 31.48 ± 23.29	< 0.001*
OSDI (preop) / OSDI (month-3)	48.32 ± 24.51 / 22.94 ± 18.39	< 0.001*

Paired Samples Test. Values are presented as number or mean and standard deviation. Preop = preoperative, sec.: seconds, mm: millimeter, $p < 0.001$ = *.

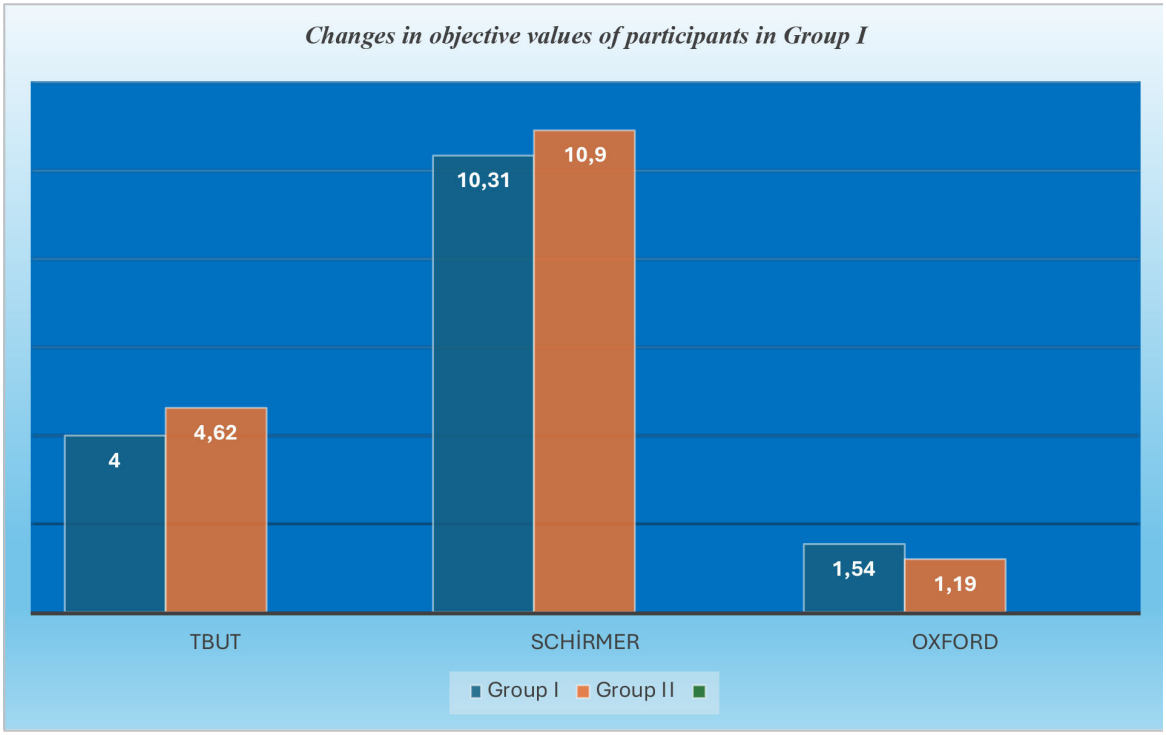

Figure 2: Changes in preoperative and postoperative 3th month objective (TBUT, Schirmer I test, Oxford Grading Scale values of participants in Group I

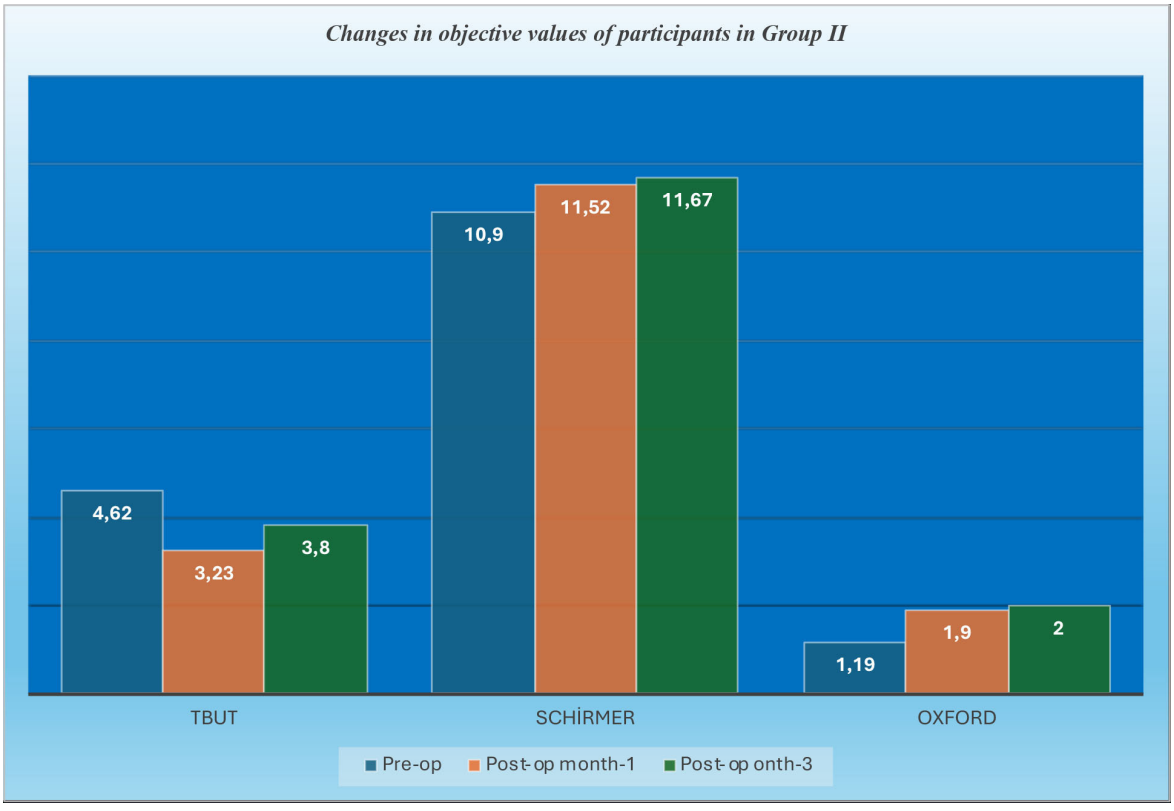

Figure 3: Changes in preoperative and postoperative 3th month objective (TBUT, Schirmer I test, Oxford Grading Scale) values of participants in Group II

DISCUSSION

In this study, 104 patients who underwent phacoemulsification were followed for three months to evaluate postoperative dry eye changes. While Group I showed stable TBUT and a temporary increase in Schirmer I test values, Group II exhibited a significant decrease in TBUT. Both groups demonstrated increased ocular surface staining (Oxford grading scale), likely influenced by preexisting Meibomian gland dysfunction. Despite these findings, subjective symptoms (OSDI scores) improved postoperatively in both groups, possibly due to the anti-inflammatory effects of steroid eye drops. Notably, patients using polyvinyl alcohol and povidone eye drops showed improvement in objective dry eye parameters, suggesting their potential benefit in maintaining ocular surface health and enhancing postoperative comfort following phacoemulsification.

When the current literature is examined, the effectiveness of artificial tear drops in various formulations after cataract surgery has been investigated. However, the studies on polyvinyl alcohol & povidone eye drops are quite limited. Hongwei Lu et al., investigated the effect of sodium hyaluronate in dry eye follow-up after phacoemulsification surgery. While TBUT and tear secretion tests were found to be higher in patients treated with sodium hyaluronate, corneal fluorescence staining score was found to be lower (8). In another study, Amer AA et al., observed patients diagnosed with cataract with dry eye during postoperative month 1, through tobramycin & dexamethasone drop treatment and adding sodium hyaluronate drop treatment to this combination. They found that patients who added sodium hyaluronate to the treatment had better effectiveness on dry eye symptoms (9). Son HS. et al., evaluated the effectiveness of semi-fluorinated alkane eye drops after cataract surgery in patients with evaporative dry eye disease and found that there was improvement starting from postoperative week 5 (10). Chen et al suggested that the addition of sodium hyaluronate eye drops to post-phacoemulsification treatment might improve tear film structure. They also found that a 0.3% sodium hyaluronate eye drop solution was more effective than a 0.1% solution (11). There are also various studies related to this matter which highlights the issue (12, 13).

The findings from this study underscore the therapeutic potential of polyvinyl alcohol and povidone eye drops in the perioperative management of patients undergoing phacoemulsification. Polyvinyl alcohol acts as a lubricating agent, while povidone has been shown to reduce ocular surface inflammation. The combination of these two agents may offer synergistic benefits in alleviating the discomfort associated with DES and preserving the integrity of the ocular surface(14). The observed improvement in dry eye signs and symptoms in Group I further emphasizes the role of artificial tears as a preventive and therapeutic measure to reduce postoperative dry eye symptoms (15).

The positive impact of artificial tears on DES prevention is consistent with the understanding that preoperative tear film instability, which is exacerbated by surgical trauma, can be mitigated by maintaining adequate lubrication. By stabilizing the tear film before and after surgery, artificial tears may reduce the inflammatory response, improve the function of meibomian glands, and ultimately prevent the exacerbation of DES (14, 16).

Polyvinyl alcohol & povidone are widely used in ophthalmic surgeries for their lubricating and protective properties, and recent studies have suggested that they may also play a role in reducing the risk of postoperative infections. Polyvinyl alcohol is a biocompatible material that helps to maintain ocular surface hydration, which can contribute to faster wound healing and a more stable postoperative environment (15). In our study, the application of polyvinyl alcohol and povidone demonstrated no cases of endophthalmitis, suggesting that these agents may contribute to the prevention of infection, although further studies are needed to confirm this protective effect. The absence of infection in both groups could indicate the effectiveness of the local antibiotics used during surgery, yet the adjunctive use of polyvinyl alcohol & povidone likely played a role in reducing overall infection risk, thus supporting their incorporation in postoperative care protocols.

In addition to the findings of the current study, it is essential to consider the influence of postoperative medications, particularly steroid drops like prednisolone acetate, on ocular surface health. Steroid use has been known to exacerbate dry eye symptoms due to its effect on tear production and the stability of the tear film. Studies have shown that steroids can impair meibomian gland function, further compromising the tear film and increasing the risk of dry eye development postop-

eratively (17, 18). Furthermore, the anti-inflammatory effects of prednisolone, while beneficial in preventing postoperative inflammation, may also contribute to a delayed recovery of the ocular surface due to prolonged suppression of the inflammatory response, which is necessary for the healing process (18). Therefore, the role of these medications in conjunction with artificial tears like polyvinyl alcohol & povidone eye drops should be carefully considered in managing dry eye symptoms, and future studies may explore optimizing postoperative regimens to balance anti-inflammatory benefits with ocular surface preservation (19).

In conclusion, during the uncomplicated phacoemulsification surgery process, OSDI improved significantly in both groups. The significant result of OSDI, in which dry eye symptoms were evaluated subjectively, did not show parallelism with objective tests. On the other hand, as a result of objective dry eye evaluation (TBUT, Schirmer I, Oxford grading scale), the significant improvement in patients using polyvinyl alcohol & povidone eye drops clearly shows that the DES process that may develop due to phacoemulsification can be well managed. It is important to reduce the risk of infection by managing DES that may occur during the pre-&postoperative period of phacoemulsification, which is a frequently performed surgery, to increase the comfort of the patient, to perform bio-microscopic examination more accurately and to prevent fluctuations in vision. Moreover, it is considered that it will contribute to the literature so that it can be applied as a probable treatment in the future.

Given the limitations of the study, there may be a longer postoperative observation period. However, when considering the literature, the fact that the DES process secondary to phacoemulsification is between 1-3 months may indicate that the follow-up period of the study is sufficient. Another limitation of this study is that parameters for evaluating meibomian gland dysfunction were not included in the study.

As a recommendation, there may be some contribution to the literature since the number of participants increases and the follow-up process would be more beneficial for the further studies.

REFERENCES

1. Duan ZH, Tang YF. The clinical effects of sodium hyaluronate, polyethylene glycol, and dextran-70 eye drops in relieving dry eye after phacoemulsification. Medicine (Baltimore). 2021;100(25): e26358.
2. Lu Q, Lu Y, Zhu X. Dry Eye and Phacoemulsification Cataract Surgery: A Systematic Review and Meta-Analysis. Front Med (Lausanne). 2021; 8:649030.
3. Naderi K, Gormley J, O'Brart D. Cataract surgery and dry eye disease: A review. Eur J Ophthalmol. 2020;30(5):840-55.
4. Nibandhe AS, Donthineni PR. Understanding and Optimizing Ocular Biometry for Cataract Surgery in Dry Eye Disease: A Review. Semin Ophthalmol. 2023;38(1):24-30.
5. Boulter T, Bernhisel A, Mamalis C, Zaugg B, Barlow WR, Olson RJ, et al. Phacoemulsification in review: Optimization of cataract removal in an in vitro setting. Surv Ophthalmol. 2019;64(6):868-75.
6. Shi DS, Jensen JD, Kramer GD, Zaugg B, Stagg BC, Pettey JH, et al. Comparison of Vacuum and Aspiration on Phacoemulsification Efficiency and Chatter Using a Monitored Forced Infusion System. Am J Ophthalmol. 2016; 169:162-7.
7. Mehuys E, Delaey C, Christiaens T, Van Bortel L, Van Tongelen I, Remon JP, et al. Eye drop technique and patient-reported problems in a real-world population of eye drop users. Eye (Lond). 2020;34(8):1392-8.
8. Lu H, Guan Y, Su Y, Nan N, Yuan Y. Effect of sodium hyaluronate eye drops combined with tobramycin, dexamethasone and pranoprofen eye drops in the treatment of dry eye after phacoemulsification. Indian J Ophthalmol. 2022;70(12):4319-24.
9. Amer AA, Abu El Wafa Ali EG, Hamed MA, Gad Elkareem AM, Ahmed Sinjab AA, Awny I. Efficacy of Adding Sodium Hyaluronate Eye Drops to Tobramycin and Dexamethasone in the Treatment of Post-Cataract Surgery Dry Eye Disease: A Retrospective Analysis and Prospective Questionnaire Assessment. Clin Ophthalmol. 2024; 18:613-21.
10. Son HS, Yildirim TM, Khoramnia R, Poompokawat P, Knorz MC, Auffarth GU. Semi-fluorinated Alkane Eye Drops Reduce Signs and Symptoms of Evaporative Dry Eye Disease After Cataract Surgery. J Refract Surg. 2020;36(7):474-80.
11. Chen N, Zhang JS, Zhang TX, Shao YS, Zhang F. The Effect of Sodium Hyaluronate on the Corneal Biomechanics of Patients with Cataract and Dry Eye Before Operation. Int J Gen Med. 2021; 14:2377-84.
12. Cagini C, Torroni G, Mariniello M, Di Lascio G, Martone G, Balestrazzi A. Trehalose/sodium hyaluronate eye drops in post-cataract ocular surface disorders. Int Ophthalmol. 2021;41(9):3065-71.
13. Park Y, Hwang HB, Kim HS. Observation of Influence of Cataract Surgery on the Ocular Surface. PLoS One. 2016;11(10): e0152460.
14. Labetoulle M, Benitez-Del-Castillo JM, Barabino S, Herrero Vanrell R, Daull P, Garrigue JS, et al. Artificial Tears: Biological Role of Their Ingredients in the Management of Dry Eye Disease. Int J Mol Sci. 2022;23(5).
15. Xiao W, Huang P. Effects of the preoperative use of artificial tears combined with recombinant bovine basic fibroblast growth factor on cataract patients complicated with dry eyes. Arq Bras Oftalmol. 2022;87(2):0539.
16. Mason L, Jafri S, Dortonne I, Sheppard JD, Jr. Emerging therapies for dry eye disease. Expert Opin Emerg Drugs. 2021;26(4):401-13.

17. Kam KW, Di Zazzo A, De Gregorio C, Narang P, Jhanji V, Basu S. A review on drug-induced dry eye disease. Indian J Ophthalmol. 2023;71(4):1263-9.

18. Khoo P, Ooi KG, Watson S. Effectiveness of pharmaceutical interventions for meibomian gland dysfunction: An evidence-based review of clinical trials. Clin Exp Ophthalmol. 2019;47(5):658-68.

19. Noyman DBE, Chan CC, Mimouni M, Safir M. The Efficacy and Safety of Standard versus Soft Topical Steroids after Cataract Surgery: A Systematic Review and Meta-analysis. Ophthalmology. 2024;131(5):595-610.

Abbreviations list

DES: Dry eye syndrome
BSS: Balanced salt solution
BCVA: Best-corrected visual acuity
OSDI: Ocular surface disease index
TBUT: Tear break-up time

Ethics approval and consent to participate

The study was approved by Nigde Omer Halisdemir University Local Ethics Committee (Approval No: 2022/58, Date: 09.06.2022).
The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000.

Consent for publication

This study is based on content analysis of the document. It does not contain any personal data.

Availability of data and materials

Data from the study were not stored digitally or physically.

Competing interests

There are no conflicts of interest. The author have no financial or proprietary interest in the materials presented herein.

Funding

This study has received no funding, granting or sponsorship.

Authors' contributions

CT contributed to the study conception and design. Data collection was performed by CT. Material preparation and analysis were performed by CT. The first draft of the manuscript was written by CT. CT read and approved the final manuscript.

Acknowledgements

I would like to thank Dr. Necmettin Kurtul for the precious help during the process of language revision and editing.