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Comparison of the Effectiveness of Levofloxacin Eye Drop 0.5% and Povidone-Iodine 2.5% Against Conjunctival Normal Flora Bacterial Colonies in Intraocular Preoperative Procedures

Petty Purwanita[1], Okta Kurniawan Saputra[1*], Erial Bahar[2] , Nurmalia Purnama Sari[3]

[1]Department of Ophthalmology, Faculty of Medicine, Universitas Sriwijaya/Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia

[2]Department of Anatomy, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia

[3]Division of Central Lab, Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia

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***Corresponding author:**
Okta Kurniawan Saputra

E-mail address:
okta_045@yahoo.com

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A B S T R A C T

Introduction: Endophthalmitis is the most severe ocular complication and often causes blindness. The incidence of endophthalmitis varies depending on the type of surgery performed, from 0.082% to 0.32%. The use of povidone-iodine and topical antibiotics on the conjunctiva has been reported to reduce the likelihood of postoperative infection. This study aimed to compare the effectiveness of levofloxacin ED 0.5% with povidone-iodine 2.5% in reducing the normal bacterial flora of the conjunctiva in intraocular preoperative procedures. **Methods:** Clinical trial experimental studies. A total of 34 research subjects participated in this study. The research subjects were grouped into treatment groups of 0.5% levofloxacin and 2.5% povidone-iodine. Analysis of differences in the number of bacterial colonies was carried out with the help of bivariate SPSS software. **Results:** Treatment with levofloxacin 0.5% eye drop was able to reduce the number of colonies by 78.11%, while treatment with povidone-iodine 2.5% was able to reduce the number of colonies by 68.57%. **Conclusion:** Levofloxacin 0.5% eye drop is superior in reducing the number of conjunctival bacterial colonies in intraocular preoperative procedures compared to 2.5% povidone-iodine.

1. Introduction

Normal flora is a collection of flora that naturally grows and reproduces in human body parts. Like every mucous membrane in the body, the conjunctival surface is abundant with normal flora. However, there are times when we have to reduce the number of these bacteria to reduce the number of infections. In the circumstances such as wounds caused by surgery, injection, or trauma, normal conditions can be disrupted. They can cause these bacteria to become infectious bacteria, which can cause infections such as conjunctivitis and even endophthalmitis.[1,2] Endophthalmitis is the most severe ocular complication and often causes blindness. The incidence of endophthalmitis varies depending on the type of surgery performed, from 0.082% to 0.32%. In cataract surgery, endophthalmitis was found in about 0.05% of two large studies from Sweden and Japan, and endophthalmitis was found in about 0.05% of patients undergoing cataract surgery. In a study conducted in the United States, 0.14% of cataract surgery patients had acute postoperative endophthalmitis. Although endophthalmitis is rare, prevention of this bacterial-caused complication is

very important, as it can lead to poor visual outcomes even with proper treatment.[3-5]

Many methods are used to minimize the occurrence of postoperative infection by reducing the number of bacteria present in the eyelids and conjunctiva. Measures such as eyelash removal, irrigation of the lacrimal sac, use of prophylactic antibiotics, and cleansing of the face and eyelids using povidone-iodine were used to reduce the number of these bacteria. The use of povidone-iodine in the conjunctiva has been reported to reduce the likelihood of postoperative infection. Povidone-iodine is very effective against a broad spectrum of microbes and does not affect wound healing. Povidone-iodine is an effective antiseptic agent. Studies show that 5% povidone-iodine is safe and effective in reducing the number of bacteria on the surface of the eye at the time of surgery. In one study, 1 to 2 drops of 5% povidone-iodine placed in the eye reduced bacterial counts by 91%. Reducing the number of bacteria in the ocular area should reduce the risk of postoperative endophthalmitis.[2-7] This study aimed to determine the effectiveness of levofloxacin 0.5% eye drop with 2.5% povidone-iodine on the number of conjunctival bacterial colonies in intraocular preoperative procedures.

2. Methods

This study was experimental research in the form of a clinical trial and used primary data from inpatients at Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia. A total of 34 research subjects participated in this study. The research subjects met the inclusion criteria, namely patients who were hospitalized to perform intravitreal surgery at Dr. Mohammad Hoesin General Hospital, Palembang, for the period May-June 2021 and have agreed to participate in this study which is marked by signing informed consent. This study was approved by the medical and health research ethics committee at Dr. Mohammad Hoesin General Hospital, Palembang, Indonesia.

The research subjects were grouped into 2 groups, namely group 1 (K1): the group that received 0.5% levofloxacin eye drops, and group 2 (K2): the group that received 2.5% povidone-iodine. Each treatment was given to the conjunctival area before the patient underwent intraocular surgery. The number of bacterial colonies before being given treatment and after being given treatment was assessed. Data analysis was performed with the help of SPSS software version 25. Univariate and bivariate analyzes were carried out in this study. Univariate analysis was performed to present the distribution of data frequencies for each test variable. Bivariate analysis was performed to compare the average number of bacterial colonies before and after treatment, with a p-value <0.05.

3. Results

Table 1 presents the baseline characteristics of the research subjects. The study results showed that the majority of research subjects were male. This study also shows that the average age of research subjects is 58.94 years, with a minimum age of 32 years and a maximum age of 76 years.

Table 1. Baseline characteristics of research subjects.

Variable	Frequency (%)	Mean (Min-Max)
Gender		
Male	18 (52,9%)	
Female	16 (47,1%)	
Age		58,94 (32-76)

Table 2 shows the average comparison of the number of colonies between treatment groups. The results of the study showed that treatment with levofloxacin 0.5% eye drop reduced the number of colonies by 78.11%. This study also showed that treatment with 2.5% povidone-iodine reduced the

number of colonies by 68.57%. This study showed that levofloxacin 0.5% eye drop was superior to 2.5% povidone-iodine in reducing the number of conjunctival bacterial colonies in preoperative procedures patients.

Table 2. Comparison of the average number of colonies between treatment groups.

Group	Average number of colonies		p-value*
	Before	After	
K1	9941,2	2176,5	0,001
K2	6176,5	1941,2	0,001

*Wilcoxon test, before vs after, p<0,05.

4. Discussion

In Lwgar and Ozgar's study, it was found that older people found more bacterial colonization; this was due to decreased tear production and changes in conjunctival goblet cells in their parents. Meanwhile, according to gender, men were found to have more bacteria in their eyes because they were more active in an open environment than women.[8-12] This difference may be due to the relatively small number of samples used. It may be necessary to take a larger number of samples to obtain a more representative result of the normal flora of the conjunctiva. In examining the number of colonies and bacterial cultures before and after levofloxacin and PVI (povidone-iodine) irrigation, the Wilcoxon test showed a statistically significant difference for the two preparations (p 0.05). This shows that the administration of eye drops using Levofloxacin and PVI is effective in reducing conjunctival bacteria. Meanwhile, the tests carried out on the number of post-dropping bacteria, with both PVI and levofloxacin, did not show a significant difference. Based on the study of Berry et al., the standard operating procedure for administering a PI that is considered to reduce the number of bacteria on the ocular surface is administering 5–10% PI to the cornea, conjunctival sac, and periocular skin for at least 3 minutes before surgery.[9] Study conducted by Zia et al. in Glasgow, Scotland, fifty-four patients undergoing daily unilateral phacoemulsification surgery between September 2006 and January 2007 were recruited for this study. None used preoperative topical antibiotics or eyelash trimming, but all were routinely advised to wash the eyelids with plain water before the day of surgery. The preoperative preparation was then carried out in the operating room with 5% povidone-iodine (1:1, 10% betadine, and normal saline). Approximately 5 ml of the excess solution is allowed to flow freely onto the surface of the eye and into the conjunctival fornix. A stopwatch operated by a member of the operating room staff is used for 3 minutes.[9-17]

Based on the research above, this is in line with the current study, where 2.5% PVI can reduce the number of bacteria on the conjunctival surface. Even in this study, the concentration of PVI used was lower than in previous studies. According to the European Society of Cataract and Refractive Surgeons (ESCRS) guidelines, the recommended PVI concentration is 5–10%; there is no clear consensus on this issue. A similar methodology is applied in American hospitals. The use of lower concentrations of PVI is common, especially in China and Japan. Shimada et al. recommend the application of a 1.25% solution for preoperative preparation.[18,19] Furthermore, 10% PVI applied for 1 minute was effective in eradicating all isolates except Staphylococcus epidermidis, which required at least 5 minutes of exposure to 10% PVI. On the other hand, the study of Silas et al. reported that PVI concentrations of 2.5% and higher effectively removed *Streptococcus epidermidis* with a single application, although the use of 0.7% and higher PVI showed similar efficacy after three applications for 30 seconds. 19 Despite the widespread use of preoperative topical antibiotic drops, some clinicians prefer not to use them at all, while others believe they have a role to play.[6,7,9,19] On the other hand, guidelines from a panel

of experts regarding the intravitreal injection (IVI) technique recommend a minimum exposure time of 30 seconds. In a study conducted by Friedman et al., exposure for 15 seconds with 5% PVI before IVI did not reduce the bacterial CFU concentration, so a minimum of 30 seconds is recommended. Other protocols were also used, such as exposure to the 5% PVI technique for 2 minutes before IVI in France.[19-22]

5. Conclusion

Levofloxacin 0.5% eye drop is superior in reducing the number of conjunctival bacterial colonies in intraocular preoperative procedures compared to 2.5% povidone-iodine.

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