pISSN:2355-7583 | eISSN:2549-4864
http://ejurnalmalahayati.ac.id/index.php/kesehatan

GAMBARAN PENGGUNAAN ANTIBIOTIK PADA PASIEN KONJUNGTIVITIS BAKTERI DI KLINIK JEC ORBITA MAKASSAR

Sri Rezky Wahyuni[1], Andi Sitti Fahirah Arsal[2*], Sri Irmandha Kusumawardhani[3], Marliyanti N.R Akib[4], Zulfikri Khalil Novriansyah[5]

[1]Program Studi Pendidikan Dokter, Fakultas Kedokteran Universitas Muslim Indonesia
[2]Departemen Farmakologi, Fakultas Kedokteran UMI, RSP Ibnu Sina YW-UMI
[3,4,5]Departemen Ilmu Kesehatan Mata, Fakultas Kedokteran UMI, RSP Ibnu Sina YW-UMI

[*)]Email Korespondensi: andisittifahirah.arsal@umi.ac.id

Abstract: Overview of The Use of Antibiotics in Patients with Bacterial Conjunctivitis at JEC Clinic Orbita Makassar. *Bacterial conjunctivitis, or "red eye," is a common eye condition caused by a bacterial infection and can cause discomfort and complications if not treated appropriately. This study aims to describe the use of antibiotics in patients with bacterial conjunctivitis at the JEC Orbita Makassar Clinic in 2023. The research method used was a quantitative descriptive design with a total sampling technique of 40 patients who met the inclusion and exclusion criteria. The results showed that the use of combination antibiotics was applied more often (57.5%) compared to the use of a single antibiotic (42.5%). The combination of antibiotics such as neomycin with polymyxin B and gramicidin has been shown to be more effective in treating Gram-positive and Gram-negative bacteria. These findings are in line with previous studies that suggest that a combination of topical antibiotics can reduce the risk of bacterial resistance better than monotherapy. In conclusion, an evidence-based approach in antibiotic selection and monitoring of local antibiotic resistance patterns is essential to improve the effectiveness of the treatment of bacterial conjunctivitis and prevent future antibiotic resistance. Education to patients, especially the elderly, is also needed to improve adherence to treatment.*
Keywords : *Aminoglycosides, Antibiotic Resistance, Antibiotic Therapy, Bacterial Conjunctivitis, Combination Treatment.*

Abstrak: Gambaran Penggunaan Antibiotik Pada Pasien Konjungtivitis Bakteri Di Klinik JEC Orbita Makassar. Konjungtivitis bakterialis, atau "mata merah," merupakan kondisi mata umum yang disebabkan oleh infeksi bakteri dan dapat menyebabkan ketidaknyamanan serta komplikasi jika tidak ditangani dengan tepat. Penelitian ini bertujuan untuk menggambarkan penggunaan antibiotik pada pasien dengan konjungtivitis bakterialis di Klinik JEC Orbita Makassar pada tahun 2023. Metode penelitian yang digunakan adalah desain deskriptif kuantitatif dengan teknik pengambilan sampel total terhadap 40 pasien yang memenuhi kriteria inklusi dan eksklusi. Hasil penelitian menunjukkan bahwa penggunaan kombinasi antibiotik lebih sering diterapkan (57,5%) dibandingkan dengan penggunaan antibiotik tunggal (42,5%). Kombinasi antibiotik seperti neomisin dengan polymyxin B dan gramicidin terbukti lebih efektif dalam mengatasi bakteri Gram-positif dan Gram-negatif. Temuan ini sejalan dengan studi sebelumnya yang menyatakan bahwa kombinasi antibiotik topikal dapat mengurangi risiko resistensi bakteri lebih baik dibandingkan monoterapi. Kesimpulannya, pendekatan berbasis bukti dalam pemilihan antibiotik dan pemantauan pola resistensi antibiotik lokal sangat penting untuk meningkatkan efektivitas pengobatan konjungtivitis bakterialis dan mencegah resistensi antibiotik di masa depan. Edukasi kepada pasien, terutama orang tua, juga diperlukan untuk meningkatkan kepatuhan terhadap pengobatan.
Kata Kunci : Aminoglikosida, Kombinasi Pengobatan, Konjungtivitis Bakteri, Resistensi Antibiotik, Terapi Antibiotik

INTRODUCTION

Bacterial conjunctivitis, commonly referred to as "pink eye," is a prevalent ocular condition characterized by inflammation of the conjunctiva due to bacterial infection. This condition is significant in clinical settings, as it can lead to discomfort, visual impairment, and potential complications if not treated appropriately. The management of bacterial conjunctivitis often involves the use of topical antibiotics, which aim to eradicate the causative pathogens and alleviate symptoms. However, the choice of antibiotics and their application in clinical practice can vary widely, influenced by factors such as local resistance patterns, patient demographics, and healthcare provider preferences. At the JEC Clinic Orbita in Makassar, the approach to treating bacterial conjunctivitis reflects a broader trend observed in various healthcare settings, where empirical antibiotic therapy is frequently employed. This practice is often guided by clinical presentation rather than microbiological confirmation, leading to potential over-prescription of antibiotics, especially in cases where the etiology may be viral or allergic rather than bacterial. Recent studies have highlighted the importance of accurate diagnosis and appropriate antibiotic selection to mitigate the risks of antibiotic resistance and ensure effective treatment outcomes (Hope et al., 2022; Mahoney et al., 2023).

The clinical implications of antibiotic use in bacterial conjunctivitis are multifaceted. While topical antibiotics such as fluoroquinolones and macrolides have demonstrated efficacy in treating bacterial infections, their overuse can contribute to the development of resistant strains of bacteria, complicating future treatment efforts (Asbell and DeCory, 2018; Karpecki et al., 2010). Moreover, the distinction between bacterial and viral conjunctivitis is critical, as antibiotics are ineffective against viral pathogens. This necessitates a careful assessment of clinical symptoms and, when feasible, microbiological testing to guide appropriate therapy (Tsui et al., 2023; Valladales-Restrepo et al., 2022). In the context of the JEC Clinic Orbita, understanding the local epidemiology of bacterial conjunctivitis, including prevalent pathogens and their antibiotic susceptibility profiles, is essential for optimizing treatment protocols. Research indicates that common bacterial agents include Staphylococcus aureus and Streptococcus pneumoniae, with varying resistance patterns that can influence treatment efficacy (Petrillo et al., 2021). Furthermore, the integration of guidelines from organizations such as the American Academy of Ophthalmology can provide a framework for clinicians to follow, promoting evidence-based practices that prioritize patient safety and treatment effectiveness (Dal Monte, 2020). The role of patient education in managing bacterial conjunctivitis cannot be overstated. Patients should be informed about the nature of their condition, the rationale behind antibiotic therapy, and the importance of adherence to prescribed regimens. This is particularly relevant in pediatric populations, where caregivers often seek immediate solutions for symptomatic relief. Studies have shown that parental understanding of conjunctivitis can significantly impact treatment compliance and outcomes (Scherer et al., 2016).

The eye is an important organ for the body as a sense of sight, and one of the structures that supports its function is the conjunctiva, which is susceptible to infection. Eye infections, including bacterial conjunctivitis, are diseases caused by viruses, bacteria, fungi or parasites. Bacterial conjunctivitis is the most common type compared to conjunctivitis due to viruses, allergies, and other causes (Aprilia et al., 2022; Septiana and Nugrahani, 2022). In developed countries such as the United States, it is estimated that acute conjunctivitis occurs in 6 million people each year, with a 2017 survey showing that only ten percent of the 3000 children suffering from acute conjunctivitis were caused by bacteria (Nurul Fhadila et al., 2024). A Taiwanese study recorded 75,488 patients with acute conjunctivitis and 158,878 patients with chronic conjunctivitis between 2000-2007, with a

recurrence rate of 4.47% for acute conjunctivitis and 1.24% for chronic conjunctivitis (Insani et al., 2017). In Indonesia, conjunctivitis is among the top 10 most common diseases in hospitals, with 68,026 new cases, consisting of 30,250 male patients and 37,776 female patients. Research at Raden Mattaher Jambi Regional General Hospital in October-November 2012 showed 74 conjunctivitis patients, with the highest age of 12-17 years (Insani et al., 2017). In North Sulawesi Eye Hospital, from June 2017-2019, bacterial conjunctivitis was the most common eye infection, reaching 42,315 cases. Data from the Makassar Community Eye Health Center showed that conjunctiva was the 7th most common eye disease in June 2018 with 468 cases (Nurul Fhadila et al., 2024; Septiana and Nugrahani, 2022).

In Manado City Community Eye Health Center, the bacteria that cause conjunctivitis include non-hemolytic Streptococcus, Bacillus subtilis, Proteus spp, Staphylococcus albus, and Pseudomonas aeruginosa (Lolowang, 2014). Effective management of conjunctivitis includes timely diagnosis, etiologic differentiation and appropriate treatment. All broad-spectrum antibiotic eye drops appear to be effective in treating bacterial conjunctivitis, with no significant differences among the various antibiotics in achieving clinical cure (Azari and Arabi, 2020). Treatment of bacterial conjunctivitis generally utilizes topical antibiotics such as gentamicin, chloramphenicol, and ofloxacin. chloramphenicol and gentamicin were the most effective antibiotics with minimal side effects, safe for children (Atmawati et al., 2017). In Northern Ethiopia, a study found that all Gram positive bacteria were susceptible to vancomycin, while some antibiotics such as norfloxacin and ceftriaxone showed resistance to Gram negative bacteria (Atmawati et al., 2017). Research at the Eye Polyclinic of RSUD Ulin Banjarmasin in August-October 2016 identified five types of bacteria causing conjunctivitis, with tobramycin showing the highest sensitivity, followed by gentamicin and polymyxin (Atmawati et al., 2017).

The existing research gap related to the management of bacterial conjunctivitis in Indonesia, particularly in Makassar, lies in the lack of a deep understanding of local antibiotic resistance patterns and their impact on the selection of appropriate antibiotics for treatment. Although various studies have shown the effectiveness of topical antibiotics such as fluoroquinolones and macrolides, there have been no studies that have comprehensively analyzed the resistance patterns of bacteria that cause conjunctivitis in these regions. In addition, the empirical treatment approach that is still often used in clinics, in the absence of proper microbiological confirmation, can contribute to over-prescribing antibiotics that risk exacerbating resistance problems. Therefore, it is important to conduct research that can identify local resistance patterns and develop more effective evidence-based treatment guidelines, in order to reduce the negative impact of antibiotic overuse and improve the treatment outcomes of bacterial conjunctivitis in Makassar.

In conclusion, the management of bacterial conjunctivitis at JEC Clinic Orbita Makassar necessitates a comprehensive understanding of antibiotic use, resistance patterns, and the clinical distinction between bacterial and non-bacterial etiologies. By fostering an evidence-based approach to treatment and emphasizing the importance of accurate diagnosis, healthcare providers can enhance patient care and contribute to the broader goal of combating antibiotic resistance in ocular infections.

METHOD

This study is a quantitative study with a descriptive design (Liberty, 2024; Swarjana, 2016) that aims to describe the use of antibiotics in patients with bacterial conjunctivitis at the JEC Orbita Clinic Makassar. The sampling technique used was total sampling (McLeod, 2019; Turner, 2020), in which all patients who met the inclusion and exclusion criteria were included in the study. The sample used in this study amounted to 40 people, obtained from the analysis of

medical records during the period January to December 2023. Inclusion criteria in this study included all patients diagnosed with bacterial conjunctivitis and receiving antibiotic therapy. Meanwhile, the exclusion criteria included incomplete medical record data, patients diagnosed with viral conjunctivitis, allergic conjunctivitis, keratitis, glaucoma, other red eye diseases, and patients who had a diagnosis of bacterial conjunctivitis along with other diagnoses. This study was approved by the Ethics Committee with approval number 424/A.1/KEP-UMI/VIII/2024. The instruments used in this study include a structured data collection form to record demographic data, clinical diagnosis, and antibiotic therapy prescribed to patients. To analyze the data, this study used univariate analysis, which aims to provide an overview of the (Agnesia et al., 2023) of antibiotic use in patients with bacterial conjunctivitis at the clinic. With this approach, it is hoped that useful information can be obtained to improve understanding of the treatment of bacterial conjunctivitis and the effectiveness of antibiotic use at the JEC Orbita Clinic Makassar.

RESULT

Table 1. Frequency Distribution of Bacterial Conjunctivitis by Gender

Gender (Sex)	n	%
Male	18	45
Female	22	55
TOTAL	**40**	**100**

Based on Table 1 regarding data analysis of the frequency distribution of bacterial conjunctivitis patients based on gender, it shows that female patients have a higher proportion compared to male patients. Out of a total of 40 patients, 22 patients (55%) were female, while 18 patients (45%) were male. This suggests that female patients have a higher risk of suffering from bacterial conjunctivitis compared to male patients.

Table 2. Frequency Distribution of Bacterial Conjunctivitis by Age

Age Classification	n	%
Toddlers	15	37.5
Children	7	17.5
Teenagers	5	12.5
Adults	6	15
Elderly	7	17.5
TOTAL	**40**	**100**

Based on table 2, the frequency distribution of bacterial conjunctivitis by age classification shows that toddlers (0-5 years) represent the largest age group affected, with 15 patients (37.5%). The second most common age groups are children (6-12 years) and the elderly (60+ years), each with 7 patients (17.5%). Adolescents (13-18 years) accounted for 5 patients (12.5%), while adults (19-59 years) comprised 6 patients (15%). These findings suggest that toddlers are the most susceptible age group to bacterial conjunctivitis, likely due to their developing immune systems and high levels of social interaction. However, the significant prevalence among children, adolescents, adults, and the elderly also highlights that bacterial conjunctivitis can affect a wide range of age groups, underscoring the importance of age-appropriate management strategies for this condition.

Table 3. Frequency Distribution of Antibiotic Combination

Antibiotic Combination	n	%
No Combination (Single)	17	42.5
Combination >1 Antibiotic	23	57.5
TOTAL	**40**	**100**

Based on Table 3, the frequency distribution of antibiotic combination use in patients with bacterial conjunctivitis reveals that 17 patients (42.5%) received single antibiotic therapy, while 23 patients (57.5%) were treated with a combination of more than one antibiotic. These results indicate that combination therapy is more commonly employed than single antibiotic therapy, with more than half of the patients receiving a multi-drug regimen. This suggests that clinicians may be opting for combination therapy to broaden the spectrum of action against a variety of bacterial pathogens and to mitigate the potential for antibiotic resistance. The use of multiple antibiotics may also reflect the complexity of the cases being treated, where a broader antimicrobial approach is needed to ensure effective management of bacterial conjunctivitis.

Table 4. Distribution of Antibiotic Group Usage

Antibiotic Group
Aminoglycosides
Polymyxin
Polypeptides
Fluoroquinolones

Based on Table 4 shows the distribution of antibiotic group usage in patients with bacterial conjunctivitis. The antibiotic groups used in this treatment include aminoglycosides, polymyxins, polypeptides and fluoroquinolones. Each group of antibiotics has a different mechanism of action and can be selected based on the type of bacteria causing the infection and its sensitivity to the antibiotic. The use of aminoglycosides, which are known to be effective against various gram-negative bacteria, may be the first choice in the treatment of bacterial conjunctivitis. Meanwhile, polymyxins and polypeptides are often used for infections caused by resistant bacteria. Fluoroquinolones, on the other hand, are a newer option and are often used for more complex infections.

Table 5. Distribution of Antibiotic Type Usage

Types of Antibiotics
Neomycin
Polimyxin B
Gramicidin
Levofloxacin
Tobramycin

Based on Table 5 shows the distribution of the use of different types of antibiotics in the treatment of bacterial conjunctivitis, which includes Neomycin, Polymyxin B, Gramicidin, Levofloxacin and Tobramycin. Neomycin, as an antibiotic from the aminoglycoside group, is effective against gram-negative bacteria and is often used in the form of ointments or eye drops. Polymyxin B is also effective against gram-negative bacteria, including Pseudomonas aeruginosa, and is often used in combination with other antibiotics. Gramicidin has good activity against gram-positive bacteria and is used for

conjunctivitis infections, while Levofloxacin, a member of the fluoroquinolone group, has a broad spectrum and is often used for more serious eye infections. Tobramycin, also from the aminoglycoside group, is effective against gram-negative bacteria and is often used for infections caused by Pseudomonas.

DISCUSSION

Distribution by Age

This study shows that bacterial conjunctivitis is more common in female patients, with 22 female patients (55%), while male patients numbered 18 (45%). These results are consistent with previous studies indicating that the majority of conjunctivitis patients are female, with 56.48% of patients being female (Berliani Tanaya, 2023). This finding demonstrates a consistent pattern, although biological and social factors may play a role in these differences. However, environmental factors and habits may also influence the spread of this disease among certain populations.

Based on age, the 0-5 age group showed the highest incidence of bacterial conjunctivitis (30%). This is consistent with research from the Journal StatPearls, which states that the first peak of conjunctivitis generally occurs in children under the age of 7, with the highest incidence occurring in the 0 to 4 age group. However, these findings differ slightly from other studies that found the highest incidence rate in the 36-45 age group (Tehamen et al., 2019). Another study in Indonesia also showed that the majority of conjunctivitis cases occur in the 11–18 age group, indicating a significant difference in age distribution (Insani et al., 2017; Shakira et al., 2012). Conjunctivitis is a disease that can occur at any age, but its prevalence is higher among children, especially in the preschool age group.

Antibiotic Use

The antibiotics of choice for treating bacterial conjunctivitis are broad-spectrum antibiotics administered topically. Antibiotics in the form of eye drops act directly on the infected area, so their effects are faster than oral antibiotics, which act systemically. Topical application results in local antibacterial activity without systemic toxicity. In this study, the use of antibiotic combinations was more common than single antibiotics, reaching 61%. Although most infections were treated with single antibiotics, there were indications for combination therapy designed to treat a broader spectrum of bacteria and reduce the risk of antibiotic resistance. Combination therapy involves the use of antibiotics with different mechanisms of action. Other studies have also shown that all broad-spectrum antibiotic drops are effective in treating bacterial conjunctivitis, with no significant differences between various antibiotics in achieving clinical cure (Azari and Arabi, 2020).

The use of antibiotic combinations has proven to be more effective than monotherapy, as each antibiotic component enhances the effectiveness of the others. Neomycin, for example, is available in various topical formulations, either alone or in combination with polymyxin, bacitracin, and other antibiotics. Gramicidin is typically used in combination with other antibiotics such as neomycin, polymyxin, bacitracin, and nystatin. The use of topical antibiotics with synergistic combinations reduces the risk of systemic side effects compared to oral antibiotics (Shatri and Tadi, 2023). This study also found that the aminoglycoside antibiotic group, such as neomycin combined with polymyxin B (from the polymyxin group) and gramicidin (from the polypeptide group), is the most commonly used combination in the treatment of bacterial conjunctivitis. These results are consistent with research by Maulidia Laela Insani, which showed that antibiotic eye drops generally use combinations of the polypeptide group, such as polymyxin, with aminoglycosides (Insani et al., 2017).

Use of Antibiotic Combinations

The use of synergistic antibiotic combinations has been shown to be more effective than monotherapy, in which each component enhances the

effectiveness of the other. Neomycin is available in various topical formulations, both as a single agent and in combination with polymyxin, bacitracin, and other antibiotics. Gramicidin, which is only available for topical use, is typically used in combination with other antibiotics such as neomycin, polymyxin, bacitracin, and nystatin. The use of gramicidin is limited to topical application due to its high systemic (Shatri and Tadi, 2023). This study found that the aminoglycoside group of antibiotics, which are most commonly used in the treatment of bacterial conjunctivitis, consists of neomycin combined with polymyxin B (from the polymyxin group) and gramicidin (from the polypeptide group) in the form of eye drops.

These findings align with research by Maulidia Laela Insani, which showed that antibiotic eye drops often use combinations of polypeptide groups like polymyxin with aminoglycosides (Insani et al., 2017). This combination is chosen to provide a broader antibacterial spectrum and enhance treatment effectiveness by reducing the likelihood of antibiotic resistance. The combination of neomycin with polymyxin B and gramicidin offers advantages in effectively addressing both Gram-positive and Gram-negative bacteria. Additionally, the use of topical antibiotic combinations offers significant advantages over systemic antibiotics, as they provide faster local effects on infected areas without the risk of harmful systemic toxicity. Therefore, the results of this study reinforce the view that appropriate antibiotic combinations are crucial for ensuring optimal recovery in patients with bacterial conjunctivitis.

Mechanism of Action of Antibiotics

Antibiotics from the aminoglycoside group, such as neomycin and tobramycin, work by inhibiting protein synthesis in bacteria through the addition of aminoglycosides to protein receptors in the 30S subunit of bacterial ribosomes, which then produces non-functional proteins (Atmawati et al., 2017). Polymyxin, on the other hand, works by binding its substance to the bacterial cell membrane, causing destabilization and damage to the bacterial cell membrane both outside and inside the cell. Additionally, polymyxin binds to and activates bacterial endotoxins. Due to its significant systemic toxicity, antibiotics from the polymyxin class are generally only used topically in combination with bacitracin or neomycin (Atmawati et al., 2017). Gramicidin, which is only available for topical use, is also typically used in combination with other antibiotics such as neomycin, polymyxin, bacitracin, and nystatin, as its systemic toxicity limits its use to topical applications only (Militello et al., 2020).

Levofloxacin works by inhibiting nucleic acid synthesis, specifically by inhibiting bacterial DNA replication (Atmawati et al., 2017). In this study, the type of antibiotic used was consistent with references stating that in cases of mild to moderate bacterial conjunctivitis, polymyxin B, erythromycin, or azithromycin may be administered. Meanwhile, in more severe cases of conjunctivitis, fluoroquinolones such as ofloxacin, ciprofloxacin, and levofloxacin can be administered (Insani et al., 2017). This study indicates that the choice of antibiotics used at JEC Orbita Clinic is consistent with existing treatment guidelines, although the use of antibiotic combinations remains the primary option to enhance treatment efficacy and reduce the risk of antibiotic resistance.

CONCLUSION

Based on the results of this study, the use of antibiotic combinations was more commonly applied than the use of single antibiotics in the treatment of bacterial conjunctivitis at the JEC Orbita Makassar Clinic. The use of antibiotic combinations, such as neomycin with polymyxin B and gramicidin, demonstrated greater effectiveness in addressing a broader spectrum of bacteria, particularly Gram-positive and Gram-negative bacteria. These findings align with previous studies indicating that topical antibiotic combinations reduce the risk of bacterial resistance more effectively than monotherapy. Additionally, the use of antibiotics in

accordance with existing treatment guidelines, such as polymyxin B, erythromycin, and azithromycin for mild to moderate cases, and fluoroquinolones for more severe cases, indicates treatment adherence to recommended clinical standards. The practical implications of these findings highlight the importance of an evidence-based approach in the treatment of bacterial conjunctivitis, with an emphasis on appropriate antibiotic selection to prevent antibiotic overuse and reduce the risk of antibiotic resistance. Therefore, it is important for healthcare providers at JEC Orbita Clinic and other clinics to continue monitoring local antibiotic resistance patterns and ensure that the therapy provided aligns with accurate microbiological diagnostic results. Additionally, it is important to enhance patient education, particularly among parents in the pediatric population, regarding the importance of adherence to treatment to improve treatment outcomes and reduce the spread of antibiotic resistance. Local data-driven policies on more controlled antibiotic use and strengthening microbiological diagnosis can be important steps in optimizing treatment and preventing potential antibiotic resistance issues in the future.

REFERENCES

Agnesia, Y., Sari, S.W., Nu'man, H., Ramadhani, D.W., Nopianto, 2023. Buku Ajar Metode Penelitian Kesehatan. Penerbit NEM, Pekalongan.

Aprilia, L., Novita Sari, A., Nurhayati, N., 2022. Uji Antibakteri Ekstrak Bunga dan Buah Kitolod (Isotoma Longiflora) Terhadap Pertumbuhan Bakteri Staphylococcus Aureus dan Escherichia Coli. Avicenna J. Heal. Res. 5, 18–27. https://doi.org/10.36419/avicenna.v5i2.677

Asbell, P.A., DeCory, H.H., 2018. Antibiotic resistance among bacterial conjunctival pathogens collected in the Antibiotic Resistance Monitoring in Ocular Microorganisms (ARMOR) surveillance study. PLoS One 13, e0205814. https://doi.org/10.1371/journal.pone.0205814

Atmawati, T.U., Faisal, M.A., Rahmiati, R., 2017. Pola Kepekaan Isolat Bakteri Aerob Pada Konjungtivitis Terhadap Antibiotik Terpilih di Poliklinik Mata Rsud ULIN Banjarmasin. Berk. Kedokt. 13, 15. https://doi.org/10.20527/jbk.v13i1.3435

Azari, A., Arabi, A., 2020. Conjunctivitis: A Systematic Review. J. Ophthalmic Vis. Res. 15, 372–395. https://doi.org/10.18502/jovr.v15i3.7456

Berliani Tanaya, L., 2023. Karakteristik Konjungtivitis di Puskesmas Besikama Kabupaten Malaka – Nusa Tenggara Timur Maret 2019 – Mei 2020. J. Locus Penelit. dan Pengabdi. 2, 218–223. https://doi.org/10.58344/locus.v2i3.917

Dal Monte, M., 2020. Dexamethasone Improves Ofloxacin Efficacy in Treating Acute Bacterial Conjunctivitis: Evidence from A Rabbit Model. Biomed. J. Sci. Tech. Res. 26. https://doi.org/10.26717/BJSTR.2020.26.004289

Hope, P.K.F., Lynen, L., Mensah, B., Appiah, F., Kamau, E.M., Ashubwe-Jalemba, J., Peprah Boaitey, K., Adomako, L.A.B., Alaverdyan, S., Appiah-Thompson, B.L., Kwarteng Amaning, E., Baanam, M.Y., 2022. Appropriateness of Antibiotic Prescribing for Acute Conjunctivitis: A Cross-Sectional Study at a Specialist Eye Hospital in Ghana, 2021. Int. J. Environ. Res. Public Health 19, 11723. https://doi.org/10.3390/ijerph191811723

Insani, M.L., Adioka, G.M., Artini, I., Agung Nova Mahendra, 2017. Karakteristik dan Manajemen Konjungtivitis Pasien Rawat Jalan di Rumah Sakit Indera Denpasar Periode Januari-April 2014. E-Jurnal Med. 6, 1–6.

Karpecki, P., Paterno, M.R., Comstock, T.L., 2010. Limitations of Current Antibiotics for the Treatment of Bacterial Conjunctivitis. Optom. Vis.

Sci. 87, 908–919. https://doi.org/10.1097/OPX.0b013e3181f6fbb3

Liberty, I.A., 2024. Metode Penelitian Kesehatan. Penerbit NEM, Pekalongan.

Lolowang, M., 2014. Pola Bakteri Aerob Penyebab Konjungtivitis Pada Penderita Rawat Jalan di Balai Kesehatan Mata Masyarakat Kota Manado. J. e-Biomedik 2, 1–8. https://doi.org/10.35790/ebm.2.1.2014.3760

Mahoney, M.J., Bekibele, R., Notermann, S.L., Reuter, T.G., Borman-Shoap, E.C., 2023. Pediatric Conjunctivitis: A Review of Clinical Manifestations, Diagnosis, and Management. Children 10, 808. https://doi.org/10.3390/children10050808

McLeod, S., 2019. Sampling Methods | Types and Techniques Explained [WWW Document]. Simply Psychol.

Militello, M., Hu, S., Laughter, M., Dunnick, C.A., 2020. American Contact Dermatitis Society Allergens of the Year 2000 to 2020. Dermatol. Clin. 38, 309–320. https://doi.org/10.1016/j.det.2020.02.011

Nurul Fhadila, Suliati P. Amir, Inna Mutmainnah Musa, Yusriani Mangarengi, Nur Aulia, 2024. Identifikasi Bakteri Penyebab Konjungtivitis. Fakumi Med. J. J. Mhs. Kedokt. 3, 880–886. https://doi.org/10.33096/fmj.v3i12.420

Petrillo, F., Pignataro, D., Di Lella, F.M., Reibaldi, M., Fallico, M., Castellino, N., Parisi, G., Trotta, M.C., D'Amico, M., Santella, B., Folliero, V., Della Rocca, M.T., Rinaldi, M., Franci, G., Avitabile, T., Galdiero, M., Boccia, G., 2021. Antimicrobial Susceptibility Patterns and Resistance Trends of Staphylococcus aureus and Coagulase-Negative Staphylococci Strains Isolated from Ocular Infections. Antibiotics 10, 527. https://doi.org/10.3390/antibiotics10050527

Scherer, L.D., Finan, C., Simancek, D., Finkelstein, J.I., Tarini, B.A., 2016. Effect of "Pink Eye" Label on Parents' Intent to Use Antibiotics and Perceived Contagiousness. Clin. Pediatr. (Phila). 55, 543–548. https://doi.org/10.1177/0009922815601983

Septiana, F.G., Nugrahani, I., 2022. Seorang Anak Perempuan Dengan Konjungtivitis Bakteri: Laporan Kasus. Contin. Med. Educ. 786–792.

Shakira, I.G., Azhar, dr. M.B., dr. Suwandi Zainul, S.M., 2012. Karakteristik Klinis dan Demografis Penderita Konjungtivitis yang Berobat. IK (Jurnal Ilmu Kedokteran) 7, 62–65.

Shatri, G., Tadi, P., 2023. Polymyxin. StatPearls Publishing, In: StatPearls [Internet].

Swarjana, I.K., 2016. Metode Penelitian Kesehatan. Andi Offset, Surabaya.

Tehamen, M., Rares, L., Supit, W., 2019. Gambaran Penderita Infeksi Mata di Rumah Sakit Mata Manado Provinsi Sulawesi Utara Periode Juni 2017 - Juni 2019. e-CliniC 8, 5–10. https://doi.org/10.35790/ecl.v8i1.26927

Tsui, E., Sella, R., Tham, V., Kong, A.W., McClean, E., Goren, L., Bahar, I., Cherian, N., Ramirez, J., Hughes, R.E., Privratsky, J.K., Onclinx, T., Feit-Leichman, R., Cheng, A., Molina, I., Kim, P., Yu, C., Ruder, K., Tan, A., Chen, C., Liu, Y., Abraham, T., Hinterwirth, A., Zhong, L., Porco, T.C., Lietman, T.M., Seitzman, G.D., Doan, T., Prajna, L., Prajna, N.V., Gunasekaran, R., Sharma, S.S., Teja, V., Chaudhary, M., Sitaula, S., Sié, A., Coulibaly, B., Bountogo, M., Somkijrungroj, T., Satitpitakul, V., Tran, H., Mai, L.H., Xuân, T.H., Tran, Y., Urzua, C.A., Vega, F., Salgado, F., Cuitino, L., Pérez, F.P., Macías Martínez, J., Lansingh, V.C., Thanapaisal, S., Laovirojjanakul, W., McKie, G., Chavez, K., Redd, T., Chamberlain, W., Sansanayudh, W., Yakoura, A.K.H., Amza, A., Youssoufou Souley, A.S., Nouhou Diori, A., Nassirou, B., Kadri, B., Mariama, B., Ibrahim, C.M., Roufaye, L.A., Boulhassane, R., Ali, S., Abdou, Z., Kelliher, C., Green, L., Ong, H.S., Mehta, J., Liu, Y.-C.,

Hwang, D.-K., Fan, N.-W., Chiong, H.S., Lacorzana, J., Cabrera-Aguas, M., Watson, S., Lebas, E., Colby, E., McLeod, S., Kanai, K., Whiteside, M., Yeh, S., Fashina, T., Chodosh, J., Tarkap, B., Garap, J.N., Mangot, M., Amel, E., Taleo, F., Kasso, J., Willie, K., Nanu, M., Rymill, P., Solomon, A.W., 2023. Pathogen Surveillance for Acute Infectious Conjunctivitis. JAMA Ophthalmol. 141, 1140. https://doi.org/10.1001/jamaophthalmol.2023.4785

Turner, D.P., 2020. Sampling Methods in Research Design. Headache J. Head Face Pain 60, 8–12. https://doi.org/10.1111/head.13707

Valladales-Restrepo, L.F., Machado-Duque, M.E., Gaviria-Mendoza, A., López-Caicedo, D.F., Ospina-Cano, J.A., Oyuela-Gutiérrez, M.C., Martínez-Pulgarín, D.F., Machado-Alba, J.E., 2022. Indication-Prescription Study For The Management of Conjunctivitis in A Colombian Population. https://doi.org/10.21203/rs.3.rs-1300227/v1