

The Characteristics of Conjunctivitis Patients at the Eye Hospital Makassar: A Recent Analysis of January – December 2023 Records

A. Alya Amaliah M^{1*}, Ratih Natasha Maharani², Yani Sodikah³, Marliyanti Nur Rahmah Akib², Nur Aulia², Hastiah⁴

¹Program Studi Pendidikan Dokter, Universitas Muslim Indonesia

²Departemen Ilmu Kesehatan Mata Fakultas Kedokteran Universitas Muslim Indonesia

³Departemen Mikrobiologi Fakultas Kedokteran Universitas Muslim Indonesia

⁴Manager Penelitian Rumah Sakit Mata Makassar

Email Corresponding:

andialyaamaliah013@gmail.com

Page : 202-210

Keywords:

Conjunctivitis, Age, Gender, Etiology, Management

Article History:

Received: 2024-10-28

Revised: 2024-11-25

Accepted: 2025-04-30

Published by:

Tadulako University,

Managed by Faculty of Medicine.

Email: healthyadulako@gmail.com

Phone (WA): +6285242303103

Address:

Jalan Soekarno Hatta Km. 9. City of Palu, Central Sulawesi, Indonesia

ABSTRACT

Background: Conjunctivitis is an inflammation of the conjunctiva caused by viruses, bacteria, fungi, or allergies, with varying prevalence based on etiology, age, gender, and season. **Objectives:** This study aims to determine the characteristics of conjunctivitis patients at the Makassar Eye Hospital from January to December 2023. **Methods:** This research employed a descriptive method with a retrospective approach using patient medical record data. The study included 118 conjunctivitis patients as the sample. **Results:** The most affected age group was 18–65 years (72%), followed by children (16.9%) and the elderly over 65 years (11%). Conjunctivitis was more prevalent in females (60.2%) than males (39.8%). The most common etiology was allergy (39%), followed by bacterial (31.4%) and viral causes (29.7%). Allergic conjunctivitis was primarily treated with artificial tears (30.4%) and antihistamines. Bacterial conjunctivitis was mainly managed with a combination of antibiotics, steroids, and artificial tears (43.2%). Viral conjunctivitis was also most frequently treated with the same combination therapy (40%). **Conclusions:** Conjunctivitis is most prevalent among individuals of productive age (18–65 years) and more common in females. Allergic conjunctivitis is the most frequent type, with artificial tears being the primary treatment.

Introduction

Conjunctivitis is an inflammation of the conjunctiva caused by various microorganisms, including viruses, bacteria, fungi, as well as allergic reactions and chemical irritants. Several factors contribute to the risk of conjunctivitis, including individual immunity, environmental conditions, lifestyle, and personal and workplace hygiene. The transmission primarily occurs through direct contact with infected individuals^{1,2}.

In children, conjunctivitis is commonly caused by bacterial and viral infections, often presenting with prominent symptoms such as red eyes and eye discharge³. Among adults,

conjunctivitis is frequently associated with viral infections and allergies. Viral conjunctivitis is one of the most common ocular infections across all population groups and tends to occur more frequently during the summer season. The second most frequent cause is bacterial infection, accounting for 50–75% of conjunctivitis cases in children. Allergic conjunctivitis contributes to approximately 15–40% of all conjunctivitis cases. It is important to note that these causes can coexist, further complicating the clinical presentation and management^{4,5}.

In Indonesia, data from the Makassar Community Eye Health Center in June 2018

identified conjunctivitis as one of the top ten most common eye diseases. The prevalence of conjunctivitis tends to be higher in females compared to males, as reported in several recent studies. This disparity may be attributed to women's greater exposure to infectious agents within household and workplace settings, particularly among women involved in childcare. Additionally, women are more prone to allergic conjunctivitis, which may be linked to sex-based differences in immune responses^{6,7}.

Although conjunctivitis rarely leads to blindness or permanent structural damage to the eye, it remains a significant public health concern due to its high transmissibility, especially in viral cases. Without proper management, viral conjunctivitis can lead to complications such as corneal inflammation, which may impair vision^{8,9}.

Given the high prevalence of conjunctivitis and its potential to spread rapidly within communities, there is an urgent need to understand the characteristics and patterns of conjunctivitis cases, especially in referral eye hospitals. A better understanding of patient demographics, etiology, and treatment patterns is essential for improving clinical management, preventing transmission, and minimizing complications. This study aims to identify and describe the characteristics of patients diagnosed with conjunctivitis at Makassar Eye Hospital during the period from January to December 2023

Materials and Methods

Research Design

This study employed a descriptive research method with a retrospective approach aimed at identifying the characteristics of conjunctivitis patients at Makassar Eye Hospital from January to December 2023. The data were collected from patient medical records, which included demographic information, clinical diagnoses,

and types of treatment administered during the study period.

Sample

The study population consisted of all patients diagnosed with conjunctivitis at Makassar Eye Hospital. The samples were selected using total sampling based on inclusion and exclusion criteria. The inclusion criteria were patients diagnosed with conjunctivitis who had complete medical records. Patients with incomplete or missing data were excluded from the study. The total number of samples that met the criteria was 118 patients.

Data Collection Techniques

The data used in this study were secondary data obtained from medical records of conjunctivitis patients during the study period. The data collected included patient demographics, type of conjunctivitis, and the treatment provided.

Data Analysis Techniques

The data were processed using descriptive statistical analysis to determine the distribution of patient characteristics, including age, gender, etiology of conjunctivitis, and treatment patterns.

Ethical Consideration

This study used secondary data from patient medical records and did not involve direct contact with the patients. The research ensured the confidentiality and anonymity of patient data. Although ethical approval was not formally obtained due to the retrospective nature of the study and the use of anonymized secondary data, this study is ethically feasible as it did not involve intervention, harm, or breach of patient privacy.

Results

The results of this study provide an overview of the characteristics of conjunctivitis patients at Makassar Eye Hospital during the period of January to December 2023. The analysis

includes the distribution of patients based on age, gender, and etiology, which can help in understanding the most affected groups and the predominant causes of conjunctivitis in this setting.

Table 1. Distribution of Conjunctivitis Patients by Age, Gender, and Etiology at Makassar Eye Hospital (January - December 2023)

Variables	Categories	Frequency (n)	Percentage (%)
Age	0–4 years	4	3.4%
	5–10 years	7	5.9%
	11–17 years	9	7.6%
	18–45 years	42	35.6%
	46–65 years	43	36.4%
Gender	>65 years	13	11.0%
	Male	47	39.8%
Etiology	Female	71	60.2%
	Allergy	46	39.0%
	Bacteria	37	31.4%
Total	Virus	35	29.7%
		118	100.0%

Source: Medical Record Data of Conjunctivitis Patients at Makassar Eye Hospital, January – December 2023

The distribution of conjunctivitis patients at Makassar Eye Hospital from January to December 2023 shows that the most affected age group is adults aged 46–65 years, accounting for 36.4% of cases, followed closely by those aged 18–45 years at 35.6%. The elderly group over 65 years makes up 11.0% of cases, while children and adolescents contribute smaller proportions, with 7.6% for ages 11–17, 5.9% for ages 5–10, and 3.4% for ages 0–4 years. Based on gender, females were more frequently affected, comprising 60.2% of cases compared to 39.8% in males. Regarding the etiology, allergic conjunctivitis was the most common cause, accounting for 39.0% of cases, followed by bacterial conjunctivitis at 31.4% and viral conjunctivitis at 29.7%. These findings suggest that conjunctivitis predominantly affects adults in their productive years, particularly females, with allergic factors being the leading cause (Table 1). The higher prevalence in adults may be attributed to greater exposure to environmental irritants, workplace allergens, and frequent social interactions, which increase the risk of

transmission. Additionally, the higher proportion in females may relate to lifestyle factors, hormonal variations, and the frequent use of cosmetic products that may trigger eye irritation or allergic reactions. These results highlight the importance of targeted preventive strategies and eye health education, especially among working-age individuals and women.

Table 2. Distribution of Conjunctivitis Management Based on Etiology

Etiology	Management	Frequency	Percentage
Allergic Conjunctivitis	Artificial Tears	14	30.4%
	Antihistamine + Antibiotic	1	2.2%
	Antihistamine + Steroid	3	6.5%
	Antihistamine + Artificial Tears	8	17.4%
	Antihistamine + Steroid + Artificial Tears	3	6.5%
	Antihistamine + Steroid + Antibiotic + Artificial Tears	3	6.5%
	Steroid + Artificial Tears	5	10.9%
	Antibiotic + Steroid + Artificial Tears	9	19.6%
	Total	46	100%
Bacterial Conjunctivitis	Antibiotic	2	5.4%
	Artificial Tears	1	2.7%
	Antibiotic + Steroid	10	27.0%
	Antibiotic + Artificial Tears	7	18.9%
	Steroid + Artificial Tears	1	2.7%
	Antibiotic + Steroid + Artificial Tears	16	43.2%
	Total	37	100%
Viral Conjunctivitis	Antibiotic	3	8.6%
	Steroid	1	2.9%
	Artificial Tears	1	2.9%
	Antibiotic + Steroid	14	40.0%
	Antibiotic + Artificial Tears	1	2.9%
	Steroid + Artificial Tears	1	2.9%
	Antibiotic + Steroid + Artificial Tears	14	40.0%
	Total	35	100%

Source: Medical Record Data of Conjunctivitis Patients at Makassar Eye Hospital, January – December 2023.

Based on the results presented in Table 2, it can be seen that the management of conjunctivitis varies according to its etiology. In cases of allergic conjunctivitis, the most common treatment is the use of artificial tears alone (30.4%), followed by combinations of antihistamines and artificial tears (17.4%), and the combination of antibiotics, steroids, and artificial tears (19.6%). Other combinations, such as antihistamines with steroids, and complex regimens involving multiple drugs, were used less frequently. This indicates that symptomatic relief using artificial tears remains

the primary approach, with additional medications used for more severe cases. In bacterial conjunctivitis, the most frequent management is the combination of antibiotics, steroids, and artificial tears (43.2%), followed by the use of antibiotics and steroids (27.0%). This shows that bacterial conjunctivitis generally requires more aggressive therapy combining anti-inflammatory and antimicrobial agents to control infection and inflammation. Meanwhile, viral conjunctivitis is most commonly treated with either a combination of antibiotics, steroids, and artificial tears (40.0%) or antibiotics and steroids (40.0%), even though viral conjunctivitis typically resolves on its own. The use of antibiotics in viral cases might reflect a precautionary approach to prevent secondary bacterial infection. In all types of conjunctivitis, artificial tears are consistently used, indicating their essential role in symptomatic relief. These findings demonstrate that combination therapies are preferred, especially in bacterial and viral conjunctivitis, to manage inflammation, infection, and patient discomfort effectively.

Discussion

Productive Age and Conjunctivitis

Based on the results of the study, the highest prevalence of conjunctivitis was found in the productive age group (18–65 years), followed by the elderly (>65 years) and children, particularly those aged 5–10 years and 0–4 years. The significant variation in prevalence across these age groups can be explained by several interrelated factors.

Environmental Exposure and Occupational Risk

Individuals in the productive age group are frequently exposed to environments that increase the risk of eye infections, such as workplaces, public transportation, and various social settings. According to Sole (2024),

environmental pollutants, dust, and chemical irritants in the workplace significantly contribute to eye irritation and infections, including conjunctivitis. Exposure to these harmful substances is more common among the working population, who often spend extended hours in such environments, increasing their risk of developing eye-related conditions¹⁰.

Social Activity and Transmission Risk

The productive age group tends to be more socially active, frequently visiting public spaces such as offices, restaurants, and public transport facilities. This high level of social interaction increases the chances of exposure to viral and bacterial agents that can cause conjunctivitis, particularly during outbreaks of infectious diseases like influenza or respiratory infections^{11,12}. Unlike children who may have more supervised hygiene practices, adults are often less cautious about eye contact and hand hygiene in busy environments, contributing to a higher transmission rate.

Personal Habits and Use of Cosmetics

Personal habits also play a significant role. Individuals in this age group commonly use personal care products such as cosmetics, including mascara and eyeliner. Improper use, infrequent replacement, or poor cleaning of these products can provide a breeding ground for bacteria and become a source of eye infection¹³. Additionally, the habit of sharing personal items like towels or pillows further increases the likelihood of infection transmission.

Poor Eye Hygiene

Insufficient eye hygiene is another risk factor contributing to the high prevalence of conjunctivitis in the productive age group. Lack of awareness or negligence in maintaining eye cleanliness, particularly after exposure to polluted environments or using cosmetics, may lead to irritation and infection¹⁴.

Stress and Immune Suppression

Furthermore, individuals in the productive age group are often subject to work-related stress and fast-paced social lives, which can contribute to chronic stress. According to Alotiby (2024), chronic stress is associated with immune system suppression, making the body more susceptible to various infections, including ocular infections like conjunctivitis^{15,16}. A weakened immune system due to prolonged stress can impair the body's ability to fend off pathogens that cause eye inflammation¹⁷.

Overall, the high prevalence of conjunctivitis in the productive age group can be attributed to a combination of occupational exposure, increased social interaction, personal habits, poor hygiene, and weakened immune defenses due to chronic stress. These interconnected factors explain why this age group is more vulnerable to developing conjunctivitis compared to other age groups.

Gender and Conjunctivitis

Based on the study results, the number of conjunctivitis cases was higher in females, with 71 cases (60.2%), compared to 47 cases (39.8%) in males. This finding may be influenced by several factors, including natural gender distribution in the population. In some communities or research settings, if there is a gender imbalance, particularly in populations dominated by females, the sample may naturally include more female participants.

Additionally, gender differences can influence the prevalence and characteristics of diseases, including conjunctivitis. Several studies have indicated that the prevalence of conjunctivitis whether allergic, bacterial, or viral may vary between genders. One contributing factor is hormonal variation. In females, hormonal changes during the reproductive years or menopause can affect ocular health and may increase susceptibility to allergic or infectious conjunctivitis. Hormonal

fluctuations can influence tear film stability, mucosal immunity, and inflammatory responses, making females more prone to ocular surface disorders^{18,19}.

Females are also more frequently engaged in activities that elevate the risk of developing conjunctivitis, such as the regular use of eye cosmetics like mascara, eyeliner, and contact lenses. Improper application or cleaning of these products can facilitate bacterial contamination and increase the likelihood of eye infections^{20,21}. Moreover, women may experience higher exposure to household cleaning agents and allergens, which could contribute to the development of allergic conjunctivitis. Occupational and social roles that bring women into closer contact with children or caregiving environments may also raise their risk of exposure to infectious conjunctivitis pathogens.

These combined factors hormonal influences, personal habits, and environmental exposures help explain why conjunctivitis cases in this study were more prevalent among females.

Etiology of Conjunctivitis

Based on the results of this study, allergic conjunctivitis was identified as the most common etiology, accounting for 39% of cases, followed by bacterial conjunctivitis (31.4%) and viral conjunctivitis (29.7%). Several contributing factors explain the predominance of allergic conjunctivitis in this study population. Environmental exposure to allergens such as dust, pollen, and pet dander, especially in urban areas like Makassar, may significantly contribute to the high incidence of allergic cases. Additionally, seasonal changes and poor air quality can exacerbate allergic responses, leading to increased prevalence. Lifestyle habits, including frequent use of cosmetic products that may contain irritants, also play a role in triggering allergic conjunctivitis, particularly among female

patients. Genetic predisposition and a history of atopic diseases such as asthma or allergic rhinitis further increase susceptibility. These combined factors highlight the need for heightened public awareness, environmental control, and appropriate preventive measures to manage and reduce the burden of allergic conjunctivitis in the community.

One significant factor is seasonal variation and increased exposure to airborne allergens such as dust, pollen, and animal dander, which can elevate the prevalence of allergic conjunctivitis, especially in regions experiencing long spring or autumn seasons. In their study, Beggs. (2021) emphasized that allergy prevalence often surges during these periods due to the abundance of allergens in the environment²².

Genetic predisposition and environmental exposure also play a critical role. Individuals with a family history of allergies or those living in environments with high allergen exposure are more susceptible to developing allergic conjunctivitis. Moreover, environmental stressors like air pollution have been shown to aggravate allergic responses by triggering inflammation in the respiratory tract and ocular surfaces. Pollutants, particularly particulate matter and chemical irritants, can exacerbate allergic reactions and heighten the risk of eye inflammation^{23,24}.

The use of cosmetics and personal care products containing allergens or irritants further contributes to the risk. Certain chemical compounds found in eye makeup or facial products can irritate the conjunctiva, especially in individuals who are already sensitive to allergens²⁵. Additionally, poor eye hygiene practices, such as frequently rubbing the eyes with unclean hands, can facilitate the direct transfer of allergens to the ocular surface, increasing the likelihood of allergic conjunctivitis. These factors collectively explain the high prevalence of allergic conjunctivitis in this study, highlighting the

importance of both environmental control and personal hygiene in the prevention of this condition.

Management of Conjunctivitis

Based on the study results, the management of conjunctivitis shows that the use of artificial tears is the most commonly applied therapy, particularly in cases of allergic conjunctivitis. Approximately 30.4% of allergic conjunctivitis cases were treated using artificial tears as the first-line therapy. The combination of antihistamines and artificial tears was used in 17.4% of cases, effectively relieving symptoms such as itching and dryness. According to Semp et al. (2023), artificial tears play a significant role in lubricating the ocular surface, rinsing allergens, and reducing irritation without serious side effects, making them the preferred initial treatment²⁶. Artificial tears also help reduce mast cell activation and histamine release, thereby alleviating allergic symptoms. Antihistamines primarily reduce allergic reactions and their effectiveness increases when combined with steroids or artificial tears, particularly in more severe allergic cases.

In bacterial conjunctivitis, the most commonly used treatment was the combination of antibiotics + steroids + artificial tears, which accounted for 43.2% of cases. This combination effectively addresses bacterial infection, controls inflammation, and maintains ocular hydration. Prost (2021) emphasized that this combined approach is optimal, especially in bacterial conjunctivitis cases accompanied by significant inflammation^{27,28}.

Meanwhile, in viral conjunctivitis, the dominant management strategies identified in this study were the combinations of antibiotics + steroids and antibiotics + steroids + artificial tears, each used in 40% of cases. Although viral conjunctivitis typically does not require antibiotics, their use aims to prevent secondary bacterial infections, which are common complications. Steroids are used to reduce

severe inflammation commonly seen in viral conjunctivitis. A study by Holland et al (2019) also supports the careful use of topical steroids to control inflammation in specific viral conjunctivitis cases²⁹. Overall, this study shows that combination therapy is the primary approach in the management of conjunctivitis, carefully tailored based on the etiology and severity of the patient's symptoms.

Conclusion

Based on the results of this study, it can be concluded that the highest prevalence of conjunctivitis occurs in the productive age group (18–65 years), with females being more frequently affected than males. Allergic conjunctivitis is the most common cause, followed by bacterial and viral conjunctivitis. The treatment of conjunctivitis depends on its etiology. For allergic conjunctivitis, the use of artificial tears is the most common therapy, while bacterial conjunctivitis is usually treated with a combination of antibiotics and steroids. Viral conjunctivitis often requires a combination of antibiotics, steroids, and artificial tears to manage both infection and inflammation.

It is recommended that preventive measures and public education be intensified, particularly for the productive age group, with a focus on workplace hygiene and safe cosmetic use. Eye hygiene education and the promotion of safe cosmetic practices should be enhanced, especially among women. In addition, patients should be properly educated regarding the safe use of steroid-containing eye drops to prevent potential side effects, such as increased intraocular pressure, and the importance of following medical advice for the appropriate treatment of conjunctivitis.

Acknowledgment

The author would like to express sincere gratitude to all those who have provided support and assistance in the completion of this

research. Special thanks are extended to the management and medical records department of Makassar Eye Hospital for granting access to the necessary data and for their cooperation throughout the data collection process. The author also wishes to thank all lecturers, colleagues, and family members who have provided invaluable guidance, feedback, and encouragement throughout this process. The continuous support and constructive input from mentors have been instrumental in shaping this study. Appreciation is also extended to peers who provided moral support and shared valuable discussions during the preparation of this paper. May the results of this study contribute positively to the development of eye health knowledge, provide useful insights for future research, and support the improvement of conjunctivitis management in both clinical practice and public health efforts.

References

1. Jasim HZ, Al-Jubory M. Understanding conjunctivitis: Symptoms, Causes, and Treatment. *Sch J App Med Sci*. 2024;12(03):255-258. doi:10.36347/sjams.2024.v12i03.007
2. Suryani L, Setyandriana Y, Meida NS. The Social-environmental Risk Factor for Conjunctivitis. *Open Access Maced J Med Sci*. 2021;9(T4):319-323. doi:10.3889/oamjms.2021.5787
3. Salam I. Analisis Kemampuan Akomodasi Mata. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*. 2022;8(2):127-131.
4. Mahoney MJ, Bekibele R, Notermann SL, Reuter TG, Borman-Shoap EC. Pediatric Conjunctivitis: A Review of Clinical Manifestations, Diagnosis, and Management. *Children*. 2023;10(5):808. doi:10.3390/children10050808
5. Suryani L, Setyandriana Y, Meida NS. The Social-environmental Risk Factor for Conjunctivitis. *Open Access Maced J Med Sci*. 2021;9(T4):319-323. doi:10.3889/oamjms.2021.5787

6. De Martinis M, Sirufo MM, Suppa M, Di Silvestre D, Ginaldi L. Sex and Gender Aspects for Patient Stratification in Allergy Prevention and Treatment. *IJMS*. 2020;21(4):1535. doi:10.3390/ijms21041535
7. Ortona E, Pierdominici M, Rider V. Editorial: Sex Hormones and Gender Differences in Immune Responses. *Front Immunol*. 2019;10:1076. doi:10.3389/fimmu.2019.01076
8. Cheung AY, Choi DS, Ahmad S, et al. Conjunctivitis Preferred Practice Pattern. *Ophthalmology*. 2024;131(4):P134-P204. doi:10.1016/j.opthta.2023.12.037
9. Muto T, Imaizumi S, Kamoi K. Viral Conjunctivitis. *Viruses*. 2023;15(3):676. doi:10.3390/v15030676
10. Solé D, Kuschnir FC, Pastorino AC, et al. V Brazilian Consensus on Rhinitis – 2024. *Brazilian Journal of Otorhinolaryngology*. 2025;91(1):101500. doi:10.1016/j.bjorl.2024.101500
11. World Health Organization, WHO Patient Safety. WHO guidelines on hand hygiene in health care. 2009;(WHO/IER/PSP/2009/01):262.
12. Stawicki S, Jeanmonod R, Miller A, et al. The 2019–2020 novel coronavirus (severe acute respiratory syndrome coronavirus 2) pandemic: A joint american college of academic international medicine-world academic council of emergency medicine multidisciplinary COVID-19 working group consensus paper. *J Global Infect Dis*. 2020;12(2):47. doi:10.4103/jgid.jgid_86_20
13. Sullivan DA, Da Costa AX, Del Duca E, et al. TFOS Lifestyle: Impact of cosmetics on the ocular surface. *The Ocular Surface*. 2023;29:77-130. doi:10.1016/j.jtos.2023.04.005
14. Warudkar S. Eyelid Hygiene: An often Overlooked Gateway to Healthy Eyes.
15. Alotiby A. Immunology of Stress: A Review Article. *JCM*. 2024;13(21):6394. doi:10.3390/jcm13216394
16. Galletti JG, De Paiva CS. The ocular surface immune system through the eyes of aging. *The Ocular Surface*. 2021;20:139-162. doi:10.1016/j.jtos.2021.02.007
17. Morey JN, Boggero IA, Scott AB, Segerstrom SC. Current directions in stress and human immune function. *Current Opinion in Psychology*. 2015;5:13-17. doi:10.1016/j.copsyc.2015.03.007
18. Milner MS, Beckman KA, Luchs JJ, et al. Dysfunctional tear syndrome: dry eye disease and associated tear film disorders – new strategies for diagnosis and treatment. *Current Opinion in Ophthalmology*. 2017;28(SUPPLEMENT 1):3-47. doi:10.1097/01.icu.0000512373.81749.b7
19. Harrell CR, Feulner L, Djonov V, Pavlovic D, Volarevic V. The Molecular Mechanisms Responsible for Tear Hyperosmolarity-Induced Pathological Changes in the Eyes of Dry Eye Disease Patients. *Cells*. 2023;12(23):2755. doi:10.3390/cells12232755
20. Baig SB, Manokaran K, Theruveethi N, Muduthan VR. Bacterial contamination in contact lens training area in private optical clinics. *J Ophthal Inflamm Infect*. 2024;14(1):26. doi:10.1186/s12348-024-00407-z
21. Petrillo F, Petrillo A, Sasso FP, Schettino A, Maione A, Galdiero M. Viral Infection and Antiviral Treatments in Ocular Pathologies. *Microorganisms*. 2022;10(11):2224. doi:10.3390/microorganisms10112224
22. Beggs PJ. Climate change, aeroallergens, and the aeroexposome. *Environ Res Lett*. 2021;16(3):035006. doi:10.1088/1748-9326/abda6f
23. Lin CC, Chiu CC, Lee PY, et al. The Adverse Effects of Air Pollution on the Eye: A Review. *Int J Environ Res Public Health*. Published online 2022.
24. Patnaik J, Dye-Robinson A, James K, Kahook M. Association Between Particulate Matter Pollutants and Ophthalmology Visits for Ocular Surface Irritation and Allergy. *OPHTH*.

- 2024;Volume 18:3263-3270. doi:10.2147/OPTH.S485199
25. Kaushik M, Farooq U, Ali MS, Ansari MJ, Iqbal Z, Mirza MA. Safety Concern and Regulatory Status of Chemicals Used in Cosmetics and Personal Care Products. *Dermato.* 2023;3(2):131-157. doi:10.3390/dermato3020011
26. Semp DA, Beeson D, Sheppard AL, Dutta D, Wolffsohn JS. Artificial Tears: A Systematic Review. *OPTO.* 2023;Volume 15:9-27. doi:10.2147/OPTO.S350185
27. Prost M. Antibiotic therapy of bacterial conjunctivitis – a practical approach. *Ophthatherapy.* 2021;8(4):240-246. doi:10.24292/01.OT.311221.S
28. P B, S K, Kk L, Kk G. Role of Topical Steroids, Anti Virals in Treating Acute Viral Conjunctivitis in Initial Presentation. *Act Sci Oph.* 2019;2(9):03-10. doi:10.31080/ASOP.2019.02.0068
29. Holland EJ, Fingeret M, Mah FS. Use of Topical Steroids in Conjunctivitis: A Review of the Evidence. *Cornea.* 2019;38(8):1062-1067. doi:10.1097/ICO.0000000000001982