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Common Pathogenic Organisms in Chronic Blepharitis in Benghazi

Tarek A. Abdulkareem[1], Jamal A. Alammari[2], Ramadan salem sati[3], Ali Guma Azbida[4*]
[1,2]College of Medical Technology, Benghazi, [3] Benghazi Teaching Eye Hospital, [4] Faculty of medical technology, Azzaytuna university, Tarhuna, Libya
[1]Tareklab77@gmail.com, [4*]a.azbida@azu.edu.ly
Corresponding Author: (*)

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ABSTRACT: Blepharitis is a common inflammatory condition of the eyelids, often associated with bacterial colonization and chronic inflammation, causing redness, irritation, and discomfort. Aim of Study: This study aimed to identify the predominant pathogens causing blepharitis, assess diagnostic methods, and determine the most effective antibiotics for treatment. Methods: A total of 20 patients (8 males, 12 females, aged 18–80) with blepharitis were sampled at Benghazi Teaching Eye Hospital between July 30 and August 30, 2024. Swabs from the eyelids were cultured on bacterial and fungal media, followed by biochemical identification of isolates. Antibiotic susceptibility was assessed using the Kirby-Bauer disk diffusion method against ten antibiotics. Results: Bacterial growth was detected in 14 samples (70%), fungal growth in 2 samples (10%), while 4 samples (20%) showed no growth. The most frequent bacteria were *Staphylococcus aureus* (43%) and coagulase-negative staphylococci (29%). Antibiotic sensitivity was highest for gentamicin and vancomycin (93%), while resistance was notable against oxacillin (57%), penicillin, and ceftriaxone (43%).

Conclusion: Blepharitis in this population is predominantly bacterial, with *S. aureus* and coagulase-negative staphylococci as the main pathogens. Culture-guided therapy using gentamicin, vancomycin, or tetracycline is recommended due to observed resistance to older β-lactam antibiotics, and fungal involvement should be considered in persistent cases.

Keywords: ***Blepharitis, Staphylococcus aureus, Antibiotic susceptibility, Eyelid infection, Gentamicin, Vancomycin.***

الملخص: التهاب جفن العين هو حالة شائعة تصيب حواف الجفون، غالباً ما يرتبط بوجود البكتيريا. الالتهاب المزمن يسبب الاحمرار والتهيج والانزعاج. هدف الدراسة هدفت هذه الدراسة إلى تحديد الممرضات الأكثر شيوعاً المسببة لالتهاب الجفن، تقييم طرق التشخيص، وتحديد المضادات الحيوية الأكثر فاعلية للعلاج. المواد وطريقة العمل: شملت الدراسة 20 مريضًا (8 ذكور، 12 أنثى، تتراوح أعمارهم بين 18–80 سنة) في مستشفى بنغازي التعليمي للعيون خلال الفترة من 30 يوليو إلى 30 أغسطس 2024. تم جمع مسحات من الجفون وزراعتها على أوساط بكتيرية وفطرية، تلتها التعرف على المزارع باستخدام الاختبارات الكيميائية الحيوية. وتم تقييم حساسية البكتيريا للمضادات الحيوية باستخدام طريقة انتشار الأقراص لعشرة مضادات حيوية. النتائج: أظهرت النتائج نمو بكتيري في 14 عينة (70%)، ونمو فطري في عينتين (10%)، بينما لم يظهر أي نمو في 4 عينات (20%). كانت البكتيريا الأكثر شيوعاً هي ***Staphylococcus aureus*** (43%) والمكورات العنقودية سالبة التجلط (29%). كانت أعلى نسب الحساسية تجاه الجنتاميسين والفانكومايسين (93%)، تلتها التتراسيكلين (86%)، بينما لوحظ مقاومة عالية للأوكساسيلين (57%) والبنسلين والسيفترياكسون (43%).

الخلاصة: تشير هذه النتائج إلى أن التهاب الجفن في هذه العينة سببه البكتيريا بشكل رئيسي، خاصة ***S.aureus*** والمكورات العنقودية سالبة التجلط كالممراضات الأساسية، ويُوصى بالعلاج بالمضادات الحيوية الموجهة وفق نتائج الزرع، مثل الجنتاميسين والفانكومايسين والتتراسيكلين، مع مراعاة احتمالية مقاومة المضادات الحيوية القديمة ومراعاة دور الفطريات في الحالات المستمرة.

الكلمات المفتاحية: التهاب الجفن، المكورات العنقودية الذهبية، الحساسية للمضادات الحيوية، عدوى الجفن، الجنتاميسين، الفانكومايسين.

I. INTRODUCTION:

Blepharitis is an inflammation along the edges of the eyelids that can cause redness, irritation, and discomfort across all age groups. The eyelids may appear greasy or scaly, with crusts that cling to the eyelashes. It can be classified into anterior and posterior blepharitis, characterized by dysfunction of the meibomian glands. Blepharitis is considered a multifactorial condition, often associated with bacterial colonization, meibomian gland dysfunction, and chronic inflammation. People with blepharitis may experience symptoms such as itching, burning, or a gritty sensation in their eyes. **(Pflugfelder, Karpecki & Perez, 2014; Viswambaran et al, 2020)**

Blepharitis is not a sight-threatening condition, but if left untreated has the potential to cause keratopathy, corneal neovascularization and ulceration, and permanent alterations in eyelid morphology. First-line management includes consistent eyelid hygiene with warm compresses and lid cleansing. In some cases, topical antibiotics may be prescribed as adjunctive therapy. **(Amescua et al, 2019; Viswambaran et al, 2020)**

Initial diagnosis is based on anamnesis with symptoms and signs of blepharitis, should be followed by a comprehensive eye examination, and Slit-lamp biomicroscopy examination. Additional examinations such as microbiological culture of the eyelids and conjunctiva eye and adnexa examination, including visual acuity examination, external eye examination, eye biomicroscopy, and intraocular pressure. **(Lin et al, 2024)**

Many studies and reports were conducted over world for this issue; reports from US primary medical providers estimate that 5% of all patients presented with signs or symptoms of blepharitis, and within primary eye care providers that number increases to >40%. **(Putnam, 2016)**

In a study was conducted in the city of Misurata showed that, the common cause of blepharitis was *S. aureus*, *S. epidermidis*, and Proteus species. **(Musa, Nazeerullah & Sarite, 2014)**

Based on the above, blepharitis can be considered a common condition that requires further study and scrutiny to determine its prevalence in Libyan society and to identify the best methods for diagnosing, treating, and preventing. So, this study aimed to shed light on this condition at Benghazi Teaching Eye Hospital - Libya.

II. AIMS OF THE STUDY:

Aims of the Study: This study aimed to identify common pathogens causing blepharitis (eyelid infection), identify the best methods for diagnosing them, and determine the appropriate antibiotic to treat blepharitis.

III. MATERIALS AND METHODS:

Study area and duration: This study was conducted at the Benghazi Teaching Eye Hospital on the period of july30, to August 30, 2024.

The study sample: The study samples were included 20 eyelids patients aged18 - 80 years, 8 males and 12 females in Benghazi city.

Sample Collection: The samples were collected from eyelids of 20 eyelids patients aged18-80 years, 8 males and 12 females.

A swab was collected from each individual, collected swabs were labeled and immediately inoculated on Blood agar, and MacConkey agar, CLED agar and Chocolate agar plates to looking for any bacterial growth; and Sabouraud dextrose agar (SDA) for searching for any fungal growth; all plates then aerobically incubated at 37°C for 24 - 48 hr. After incubation, the isolated bacterial colonies were purified and then identified according to Gram stain and morphology, followed by biochemical tests "Catalase, Coagulase, Mannitol salt agar test (MSA), DNAase, Alpha hemolysis, Optachin test, Bacitracin test, Motility indole urease test (MIU), Citrate, Triple sugar iron test (TSI), Oxidase test".

After the pure bacteria were isolated and identified, antibiotic susceptibility testing has been performed using Mueller-Hinton agar to test antibiotic sensitivity. The Kirby-Bauer Disk Diffusion assay was used to test the sensitivity of the bacterial isolates to 10 different antibiotics (Amoxicillin, Penicillin, Ceftriaxone, chloramphenicol, Ciprofloxacin, Tetracycline, Amikacin, Vancomycin, Gentamicin and Oxacillin). The tested bacterial isolates were classified as sensitive or resistant according to the inhibition zones diameters of the Clinical Laboratory Standards. **(CSLI, 2020)**

IV. RESULTS:

The current study was conducted on 20 samples, approximately 14(70%) of which showed bacterial growth, 2(10%) showed fungal growth while 4(20%) showed no growth at all, as illustrate in Table 1 and Figure 1.

V. Table1: appears culture results in study sample.

Results	Total	Type of growth	Frequency
Positive	16 (80%)	Bacteria	14 (70%)
		Fungi	2 (10%)
Negative	4 (20%)		

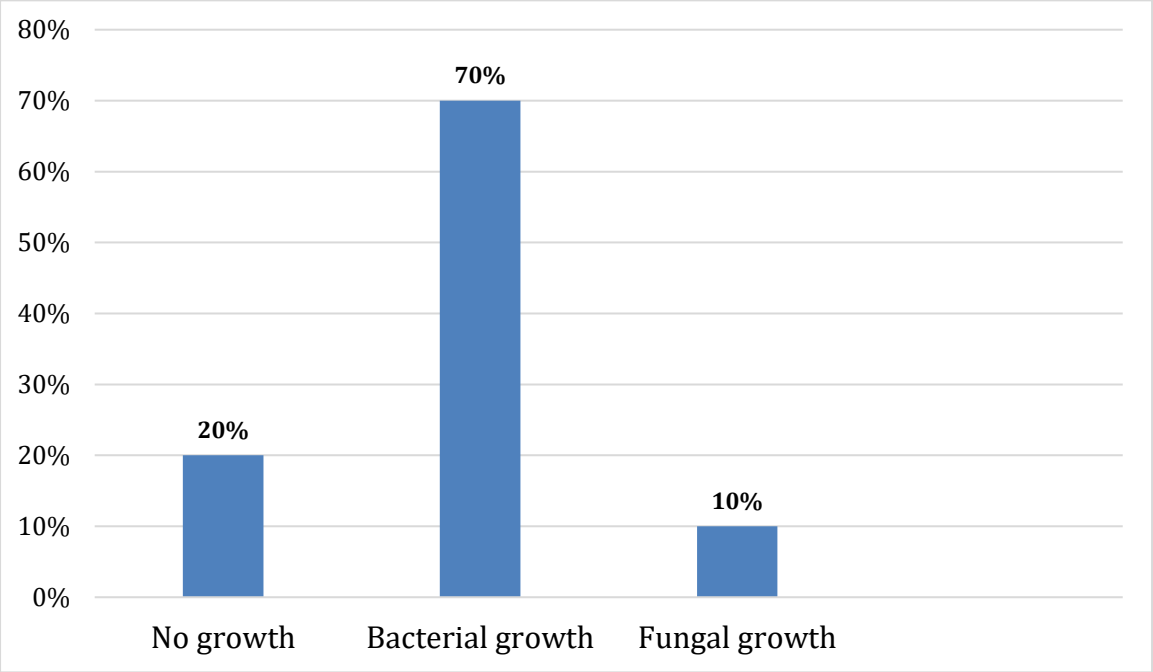

Figure 1: shows results of microbial growth distribution among studded cases.

The results of this study showed that 87.5% of the 16 samples that showed microbial growth were bacterial, while in the other 12.5% the growth was fungal, as shown in Figure 2.

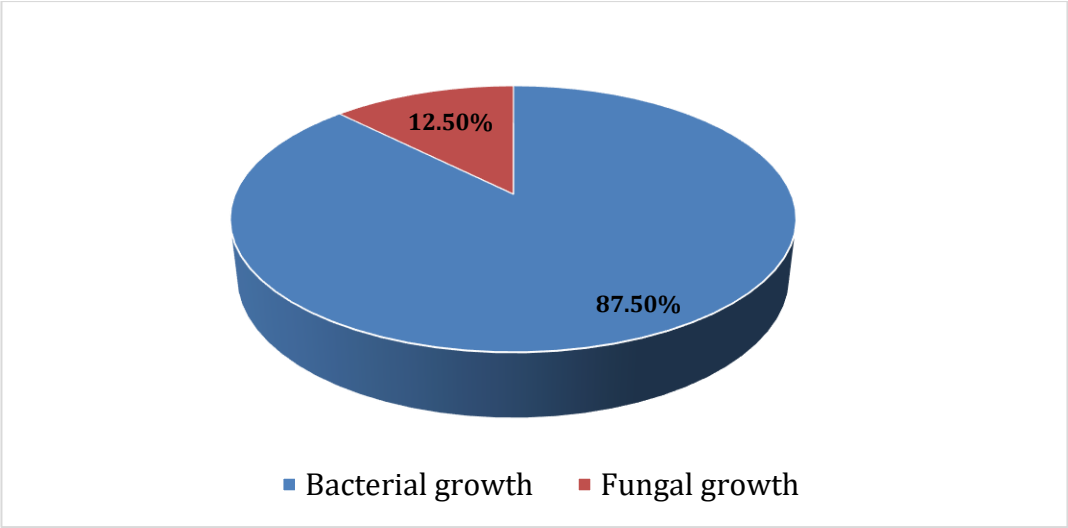

Figure 2: describe the ratio of bacterial to fungal growth in.

As illustrates in table 2, the findings of current study showed that the most frequent isolated bacteria were Staphylococcus aureus followed by coagulase negative Staphylococci and least frequent proteus spp and Pseudomonas spp.

Table 2: Distribution of bacterial isolates from eyelash.

Type of isolated bacteria	N	%
Staphylococcus aureus	6	43%
Coagulase Negative Staphylococci	4	29%
Streptococcus pneumonia	2	14%
Proteus spp	1	7%
Pseudomonas spp	1	7%

Finally, the results of antibiotic sensitivity test showed that the highest sensitivity was for both of Gentamycin and Vancomycin by 93%, followed by Tetracycline by rate of 86%, while the least sensitivity was for Oxacillin 43%; on contrast, the highest resistant was against Oxacillin in 57% followed by Penicillin and Ceftriaxone by 43% for both of them, while the least resistant was against Gentamycin and Vancomycin by 7% for both; as shown in table 3.

Table 3: Distribution of antibiotics according to resistant and sensitivity of the isolated bacteria against these antibiotics.

Antibiotics	Sensitive		Resistant	
	N	%	N	%
Penicillin (30 µg)	8	57 %	6	43 %
Ciprofloxacin (30 µg)	11	79 %	3	21 %
Gentamycin (10 µg)	13	93 %	1	7 %
Tetracycline (30 µg)	12	86 %	2	14 %
Vancomycin (30 µg)	13	93 %	1	7 %
Amikacin (30 µg)	10	71 %	4	29 %
Ceftriaxone (30 µg)	8	57 %	6	43 %
Amoxicillin (25 µg)	7	50 %	7	42.5 %
Chloramphenicol (30 µg)	10	71 %	4	29 %
Oxacillin (1µg)	6	43 %	8	57%

VI. DISCUSSION:

The findings of this study indicate that bacterial pathogens are the primary cause of blepharitis in the studied population, with *Staphylococcus aureus* and coagulase-negative staphylococci being the most frequently isolated organisms. This pattern aligns with recent studies from Ethiopia (**Woreta et al, 2022)** and Pakistan (**Mahmood et al, 2023**), which similarly reported staphylococcal species as predominant in external ocular infections. Less frequent isolates, including *Streptococcus pneumoniae*, Proteus spp., and Pseudomonas spp, were also detected, reflecting the occasional involvement of gram-negative bacteria as reported in regional studies.

Fungal growth was identified in a small proportion of cases, highlighting that while bacterial infections dominate, fungi can play a role in persistent or treatment-resistant blepharitis. This observation is supported by findings from **Zou et al. (2024**), who emphasized the potential involvement of fungal organisms and Demodex-associated microbiota in ocular surface disease.

Antibiotic susceptibility patterns revealed high sensitivity of bacterial isolates to gentamicin, vancomycin, and tetracycline, whereas resistance to penicillin, oxacillin, and ceftriaxone was notable. These results mirror regional and international trends in ocular pathogen resistance (**Li et al, 2024; Woreta et al, 2022**), reinforcing the need for culture-guided therapy rather than reliance on empirical treatment alone. Implementing routine microbial testing can improve treatment outcomes and help mitigate the development and spread of resistant strains.

VII. CONCLUSION:

In conclusion, blepharitis in the studied population is predominantly bacterial, with *S. aureus* and coagulase-negative staphylococci as the leading pathogens, while fungi contribute to a smaller but relevant proportion of cases. Antibiotic testing demonstrates that gentamicin, vancomycin, and tetracycline remain highly effective, whereas resistance to older β-lactam antibiotics is significant. These findings emphasize the importance of culture-based diagnosis and targeted antimicrobial therapy to ensure successful treatment and reduce the risk of resistance. Future studies should include larger patient samples and molecular analysis of isolates to enhance understanding of regional pathogen distribution and resistance mechanisms.

VIII. RECOMMENDATIONS:

Based on the findings of this study, it is recommended that routine culture and sensitivity testing be performed for patients with blepharitis to ensure targeted and effective therapy. Gentamicin, vancomycin, and tetracycline are suggested as first-line antibiotics, while the use of penicillin, oxacillin, and ceftriaxone should be monitored due to observed resistance. Fungal pathogens should also be considered in persistent or treatment-resistant cases. Promoting proper eyelid hygiene can help prevent infection and recurrence. Finally, larger-scale studies with molecular characterization of isolates are encouraged to enhance understanding of pathogen distribution and antimicrobial resistance patterns in the region.

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