

Research Article

Isolation and Identification of Pathogenic Bacteria that Cause External Ocular Infections in Sabha City Libya

Abdelkader Alsanousi G. Elzen^{1*} and Alsadig Mohammed Abdalla²

¹Faculty of Science, Sabha University, P.O. Box 18758, Sabha-Libya.

²Department of Microbiology, Faculty of Medicine, Sabha University, P.O. Box 18758, Sabha-Libya.

Abstract: The aim of this study was the isolation and identification of the specific bacterial pathogens causing ocular infections in patients attending Sabha Eye Clinics. A total of 120 samples were collected using a sterile cotton swab from patients with conjunctivitis (aged between 1 to more than 60 years) attending different Eye Clinics in Sabha city (under the supervision of ophthalmologists). All samples were examined by Gram stain, culture on blood agar, mannitol salt agar and MacConkey agar. Different biochemical tests were studied. Results revealed that the species of bacteria isolated were: *Staphylococcus aureus* (40%), Coagulase-negative *Staphylococci* (20%), *Klebsiella pneumoniae* species (10%), *Pseudomonas aeruginosa* (22%) and *E. coli* 8%.

Keywords: Ocular Infections, Isolation, Identification of pathogenic bacteria.

1. Introduction

Ocular infections are common and vary from self-limiting to sight-threatening. All the structures of the eye can be infected by various microbes (Hemavathi *et al.*, 2014). Infections of the external eye account for a significant percentage of ocular inflammations, some of which lead to visual losses as a result of corneal involvement (Esenwah, 2005). Although it is claimed that practically every conjunctival sac exhibits some flora. Bacteria cultured from the conjunctival sac are usually similar to those found in the upper respiratory tract and the skin, with majority being gram-positive bacteria, most commonly *Staphylococcus* sp. and *Corynebacterium* sp. In addition, the eyelid margins and conjunctival sacs of healthy subjects can also contain gram-negative pathogens (McClellan, 1997). Pathogenic microorganisms cause ocular disease due to virulence and host's reduced resistance because of the factors like personal hygiene, living conditions, socio-economic status, decrease immune status, etc. The areas of the eye that are frequently infected are the conjunctiva, lid, and cornea (Tsfaye *et al.*, 2013). External bacterial infections of the eye are usually localized but may frequently spread to adjacent tissue, from the conjunctiva to the cornea, the inner eye, the

orbit and the brain. The conjunctival sac and lid margins of the eye harbor a variety of microorganisms; the bacteria present in the conjunctival sac form a constant source of infection to other parts of the eye (Sharma, 1988). Infection of the eye leads to conjunctivitis, keratitis, endophthalmitis and other infections which are responsible for increased incidence of morbidity and blindness worldwide (Sherwal and Verma, 2008).

This study was undertaken to isolate and identify the specific bacterial pathogens causing ocular infections in patients attending Sabha Eye clinics.

2. Material and methods

A total of 120 samples were collected using a sterile cotton swab from patients with conjunctivitis (aged between 1 to more than 60 years) attending different Eye Clinics in Sabha city (under the supervision of ophthalmologists). All samples were transferred immediately to the microbiology laboratory, examined by Gram stain, culture on blood agar, mannitol salt agar and MacConkey agar. The growth was identified by standard laboratory procedures according to Cowan and Steels (Barrow & Feltham, 2003).

*Corresponding author:
E-mail: alobjly59@gmail.com.

3. Results and Discussion

Results revealed that the species of bacteria isolated were: *Staphylococcus aureus* (40%), Coagulase-negative *Staphylococci* (20%), *Pseudomonas aeruginosa* (22%), *Klebsiella pneumoniae* species (10%), and *E. coli* 8% (Table 1).

Table 1. Type of bacteria isolated (frequency and percentage).

Species of bacteria	Number	Percentage
<i>Staphylococcus aureus</i>	48	40%
CON <i>Staphylococcus</i>	24	20%
<i>Pseudomonas aeruginosa</i>	26.4	22%
<i>Klebsiella pneumoniae</i>	12	10%
<i>E. coli</i>	9.6	8%
Total	120	100%

This is in agreement with the results obtained by Ogbolu *et al.*, (2011) and Hemavathi *et al.*, (2014).

In our study, the predominant bacterial species isolated were *Staphylococcus aureus* (40%) and Coagulase negative *Staphylococci* (20%). The prevalence of *S. aureus* in causing conjunctivitis has been reported to be higher in many parts of the world. (Stenson *et al.*, 1982). Bacterial infections of the skin may also affect the eyes. For example, *Staphylococcus aureus* infections of sebaceous glands in the skin near the eye (sties) (Bauman, 2012). *S. aureus* predominates in eyelids and conjunctival infections and coagulase-negative staphylococci in intraocular tissue infections. Acute and chronic infection of the eyelids margin and glands of the eyelid are reported predominantly by *S. aureus* and *S. epidermidis* (Alvarez and Tabbara, 1996).

Pseudomonas aeruginosa represents (22%) of the bacterial isolates in this study. *P. aeruginosa* is an opportunistic pathogen. The organism can cause conjunctivitis, keratitis, or endophthalmitis when introduced into the eye by trauma or contaminated medication or contact lens solution. Keratitis can progress rapidly and destroy the cornea within 24 to 48 hours (Ryan and George, 2004).

E. coli represent 8% of our bacterial isolates, Esenwah, (2005) reported that 15% of his isolates were *E. coli* bacteria. *E. coli* had been reported to be responsible for certain ocular inflammations such as endophthalmitis, keratitis, conjunctivitis, blepharitis, orbital cellulitis and dacryocystitis (Briuser, 1996).

References

- [1]. Alvarez, H., Tabbara, K.F. (1996). Infections of the eyelid. In: Tabbara K.F., Hyndiuk R.A., editors. Infections of the Eye. 2nd ed. Boston: Little Brown and Company, pp. 559-570.
- [2]. Barrow, G.I. and Feltham, R.K.A. (2003). Cowan and Steel's Manual for Identification of the Medical Bacteria. 3rd edition. Cambridge University Press, Cambridge, U.K. pp. 45-120.
- [3]. Bauman, Robert W. (2012). Microbiology: with diseases by body system; Contributions by Elizabeth Machunis-Masuoka, Jean E. Montgomery; Clinical consultants, Cecily D. Cosby, Janet Fulks, John M. Lammert. – 3rd ed. Copyright© 2012, Pearson Education, Inc., publishing as Benjamin Cummings.
- [4]. Briuser, J.H. (1996). Ocular Bacteriology. Infections of the Eye. 2nd Edn. Little Brown and Company, Boston, pp 137.
- [5]. Esenwah, E. (2005). Isolation and identification of the microorganisms most prevalent in external eye infections as seen in an eye clinic in Owerri. *Journal of the Nigerian Optometric Association*, 12:6-9.
- [6]. Hemavathi, Sarmah, P., Shenoy, P. (2014). Profile of Microbial Isolates in Ophthalmic Infections and Antibiotic Susceptibility of the Bacterial Isolates: a study in an eye care hospital, Bangalore. *Journal of Clinical and Diagnostic Research*, 8(1): 23-25.
- [7]. McClellan, K.A. (1997). Mucosal defense of the outer eye. *Surv. Ophthalmol.*, 42:233-46.
- [8]. Ogbolu, D.O., Alli, O.A.T., Ephraim, I.E., Olabiyi, F.A., Daini, O.A. (2011). In-vitro efficacy of Antimicrobial Agents used in the Treatment of Bacterial Eye Infections in Ibadan, Nigeria. *African Journal of Clinical and Experimental Microbiology*, 12(3): 124-128. DOI: 10.4314/ajcem.v12i3.7
- [9]. Kenneth J. Ryan and C. George Ray (2004). Sherris Medical Microbiology: An Introduction to Infectious Diseases, 4th Edition, McGraw-Hill Medical Publishing Division, by the McGraw-Hill Companies.
- [10]. Sherwal, B.L. and Verma, A.K. (2008). Epidemiology of Ocular Infection Due to Bacteria and Fungus – A Prospective Study. *Journal of Medical Education & Research*, 10(3): 127-131.
- [11]. Sharma, S. (1988). Ocular Microbiology. 1st ed. Arvind Eye Hospital Publication, Madurai.
- [12]. Stenson, S., Newman, R., Fedukowicz, H. (1982). Laboratory studies in acute conjunctivitis. *Arch. Ophthalmol.*, 100:1275-7.
- [13]. Tesfaye, T., Beyene, G., Gelaw, Y., Bekele, S., Saravanan, M. (2013). Bacterial Profile and Antimicrobial Susceptibility Pattern of External Ocular Infections in Jimma University Specialized Hospital, Southwest Ethiopia. *American Journal of Infectious Diseases and Microbiology*, 1(1): 13-20. DOI: 10.12691/ajidm-1-1-3.