

Research Article

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A study of normal bacterial flora of the conjunctiva in patients undergoing cataract surgery in a rural teaching hospital in R. R. district

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Abstract

Introduction: Eye harbours bacteria from the time of birth throughout life. Disease will be caused, when the normal flora lose co-dependence and co-regulation with the host. Knowing the organism found most frequently in the ocular flora and their antibiotic sensitivity may provide a better guide in choosing an antibiotic for prophylaxis of postoperative endophthalmitis.

Materials and methods: 100 patients from the ophthalmology department of various age and sex were studied. Swabs were cultured aerobically on sheep blood agar, chocolate agar, MacConkey agar and nutrient agar media. All the isolates were subjected to antibiotic sensitivity of Kirby Bauer disc diffusion method. **Results:** Out of 100 patients 54% were females and 46% were males. The conjunctival swab of 48% of patients was sterile. The predominant isolate was *Staphylococcus epidermidis* (32%) followed by diphtheroids (11%). All the isolates were sensitive to gentamicin, tobramycin, ciprofloxacin. **Conclusion:** Conjunctival colonization with aerobic bacteria accounts for approximately 50% of healthy people. The inner canthus was the most contaminated site. Coagulase-negative staphylococci are the main components of this flora. Instillation of antibiotics into the conjunctival sac to make it sterile prior to surgery can prevent post-operative infection by the normal bacterial flora of conjunctiva.

Keywords: Conjunctiva, Normal flora, *Staphylococcus epidermidis*, Antibiotic sensitivity.

Introduction

The eye harbours bacteria from the time of birth throughout life.¹ The conjunctival sac, a semi-open cavity, is parasitized with microflora throughout our lifetime from when we were born, and the microbiota, which does not always cause abnormal senses or sickness, are called the conjunctiva normal flora in microbiology. Normal flora plays an important role in keeping our ocular surface healthy. Disease will be caused when the normal flora lose codependence and co-regulation with the host.²

Eye surgeons use several pre-and postoperative methods to prevent the occurrence of endophthalmitis, the most common of which is the administration of topical antibiotic drops at regular intervals.³ Use of antibiotic prophylaxis pre-and postoperatively in reducing the risk of endophthalmitis remains controversial. There are no standard guidelines on the type of antibiotic to be used in this setting. Bacteria are the most common cause of endophthalmitis. Knowing the organisms found most frequently in the ocular flora and their antibiotic sensitivity may provide a better guide in choosing an antibiotic for prophylaxis of postoperative endophthalmitis. The most common

site of the organism that is known to cause endophthalmitis is the conjunctiva itself.⁴ Several studies have shown coagulase-negative staphylococcus to be the most common organism causing endophthalmitis and also the most common organism isolated among the conjunctival flora.^{5,6}

Materials and methods

100 healthy patients attending the ophthalmology department of our institute for cataract surgery between January 2013 to December 2013 of various age and sex were studied.

All patients with cataract and no signs of intraocular and extraocular infection were included in the study. All children and patients with other ocular symptoms were excluded from the study.

Slit-lamp examination was performed on each patient with particular attention to any evidence of dry eye, blepharitis, anterior segment infection, inflammation, or lens opacity prohibiting fundus examination.

Prior consent was taken from all the patients before obtaining the conjunctival swabs.

Specimen

Specimens were taken by sterile broth moistened cotton swabs from inner canthus, upper and lower fornices of both eyes. All precautionary measures were taken to avoid lid margin and eyelashes while taking the swab. The conjunctival swabs collected from the patients were immediately sent to the laboratory.

Swabs were cultured aerobically on sheep blood agar, chocolate agar, MacConkey agar and nutrient agar media. The Gram-staining was done for each swab. Culture media were incubated at 37 °C for 24-48 hours. To identify the organisms, Gram stained films from cultures were done, and if they revealed: (i) Staphylococci: coagulase, fermentation of trehalose, mannitol and sucrose were done. (ii) Gram negative bacilli: motility, growth of MacConkey's medium, sugar fermentation tests, oxidase, gelatinase, indole, nitrate reduction tests were done. (iii) Gram positive bacilli: Oxidase, catalase, gelatinase, urease and sugar fermentation tests were done.⁷

All the isolates were subjected to antibiotic sensitivity of Kirby Bauer disc diffusion method.

The following antibiotics were used: gentamicin (10µg), tobramycin (10µg), and ciprofloxacin (5µg). The antibiotic

sensitivity was done according to the Clinical Laboratory Standards Institute (CLSI) guidelines.⁸

Results

A total of 100 patients attending the ophthalmology department for cataract surgery were included in this study. Out of 100 patients 54% were females and 46% were males. The maximum number of patients was in the age group 61-70 years (52%). 18% were diabetics and 12% were hypertensive on medication and was brought under control prior to surgery. 80% had immature cataract, 10% mature cataract, 5% had senile premature cataract, 4% had complicated cataract and one case of angle closure glaucoma. The conjunctival swab of 48% of patients was sterile and showed no growth in culture media. The culture positivity was seen in 58% of patients, out of which the predominant isolate was *Staphylococcus epidermidis* (32%) followed by diphtheroids (11%) *Staphylococcus aureus* (10%), a combination of diphtheroids and coagulase negative *Staphylococcus* (3%), non hemolytic *Streptococci* (2%).

Comparing culture results of specimens obtained from different sites of the eye revealed that the upper fornix was the most sterile site (50%), followed by the lower fornix (24%) whereas the inner canthus was shown to be the least sterile (16%).

The bacteria isolated were subjected to antibiotic sensitivity to gentamicin, tobramycin, ciprofloxacin. All the isolates were sensitive to all the above antibiotics.

Discussion

Postoperative endophthalmitis is the most dreaded complication of cataract surgery and conjunctival flora has been blamed to be the primary and most frequent source of bacteria. So evaluation of the conjunctival bacterial flora and their sensitivity pattern is of utmost importance.

In this study out of 100 patients 54 (54%) were females and 46 (46%) males. In the study conducted by Belur r Keshav et al 19 (33.9%) were males and 37 (66.1%) were females.⁹

In our study, we were able to isolate bacteria in 58 eyes (58%). In a study by Reza *et al.*, the percentage isolation was found to be 52.4%.⁵ Another study by Terence *et al.* showed the isolation was of the order of 80%.⁶ In a study by Belur r Keshav *et al* the percentage of isolates was 48.3%.⁹

Studies on the frequency of normal conjunctival sacs which are sterile have shown marked disparity. At the low end of the spectrum, Perkins and colleagues, Chang, Matuura, and Locatcher-Khorazo and Seegal respectively, reported 9.4%, 9%, 2-5%, and 0% of conjunctivae to be sterile.¹⁰⁻¹² At the upper end Bachrach *et al.*, Debnath, McNatt *et al.*, and Smith' reported 33%, 30%, 39%, and 47% respectively to be sterile.¹³⁻¹⁶ In this study the conjunctiva was sterile in 42% of cases.

In this study the upper fornix was most sterile followed by lower fornix and inner canthus was least sterile, which was also observed in a study conducted by Magda *et al.*¹⁷

The aerobic bacterial flora of the normal adult human conjunctiva has been studied by numerous authors during the past 50 years. In this study the common isolate was staphylococcus epidermidis (32%) followed by diphtheroids (11%), which was similar to study conducted by Zaire R, *et al* who also reported *Staphylococcus epidermidis* as the most common isolate followed by Diphtheroids.¹⁸

Climate and geographic area are important determinants of ocular flora as are hygienic conditions. The flora changes to *Staphylococcus aureus* and gram negative bacilli in hospitalized patients.¹⁹

Staphylococcus and diphtheroids enter the eye from the skin, nose and hands are also a potential areas from which the eye can acquire bacteria. The importance of all these organisms is such that when they are present in the eye of a patient awaiting surgery all except *Corynebacterium xerosis* can become pathogenic at one time or the other.²⁰

The isolates were subjected to antibiotic sensitivity testing to commonly used antibiotics like gentamicin, tobramycin, ciprofloxacin and the isolates were found to be sensitive to above, antibiotics, which is similar to study conducted by Ajay A Kudva *et al.*²¹

The most common source of infection is preocular tear film, lacrimal sac and skin. The normal adult pre ocular tear film is a host of a number of different microorganisms. It has been well established that prophylactic antibiotic therapy can significantly decrease the number of organisms in the preocular tear film. The ability of the topical antibiotic to affect conjunctival flora depends on specific antibiotic, timing of dose and frequency of administration.²²

Conclusion

Conjunctival colonization with aerobic bacteria accounts for approximately 50% of healthy people. The inner canthus was the most contaminated site. Coagulase-negative staphylococci are the main components of this flora. Instillation of antibiotics into the conjunctival sac to make it sterile prior to surgery can prevent post-operative infection by the normal bacterial flora of conjunctiva.

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