

Original Research Article

Bacterial flora in the conjunctiva among the patients undergoing cataract surgery

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ABSTRACT

Background: The present study was aimed in identifying the normal organisms found in the conjunctiva of healthy eyes among the individuals undergoing cataract surgery and also antibacterial susceptibility of the isolates. Cataract is the major cause of blindness in the developing countries, cataract surgery is one of the common surgical practices.

Methods: Study was conducted in the department of Microbiology, GSL Medical College from May to July 2018. Surgically removed cataract lens was collected in sterile nutrient broth and transported to Microbiology laboratory for culture and sensitivity testing. The broths were incubated at 37°C for 24 hours subcultured on Blood agar, MacConkey agar and Nutrient agar, incubated aerobically at 37°C for 24 hours and then examined for bacteria growth according to standard protocol. After incubation growth was identified by colony morphology, gram staining and biochemical tests. Antibiotic sensitivity testing was done on Muller-Hinton agar by the disk diffusion method.

Results: During the study period, 58 samples were collected; the male female ratio was 1.14. Maximum strains were isolated among female; the male female ration was 0.95. Increase in flora was observed with age. No significant drug resistance was observed.

Conclusions: This is a hospital based study which is not true representation of the community. Hence a community based study with large sample by considering the comorbid conditions such as occupation, diabetes, immune status can give the authentic data on the conjunctival flora.

Keywords: Bacteria, Bacilli, Cocci, Conjunctiva, Flora, Surgery

INTRODUCTION

Cataract is the major cause for blindness in developing countries such as India.¹ Cataract surgical rates have increased considerably over the past decade in India. Being a common surgery, post-operative endophthalmitis is one of the common complications of cataract surgery.²

Various studies conducted in the past have shown that patient's own indigenous bacterial flora of the eyelids and conjunctiva is the most common offender. Previous

studies have shown that there was a wide variation in the pattern of the normal bacterial flora of the eye depending on the climatic and geographical variations and there was a drastic reduction in the incidence of postoperative endophthalmitis due to usage of preoperative topical antibiotics.³

It is a well known fact that the lid margins and the conjunctiva are usually unsterile. Soon after birth they are invaded by host bacteria and remain so throughout life. The present study has been aimed at identifying the

normal organisms found in the conjunctiva of healthy eyes among the individuals undergoing cataract surgery and also antibacterial susceptibility of the isolates.

METHODS

Study was conducted in the department of Microbiology, GSL Medical College from May to July 2018. Surgically removed cataract lens was collected in sterile nutrient broth and transported immediately to Microbiology laboratory for culture and sensitivity testing. The broths were incubated at 37°C for 24 hours, subcultured on Blood agar, MacConkey agar and Nutrient agar. The inoculated media were incubated aerobically at 37°C for 24 hours and examined for bacteria growth according to standard protocol.⁴

After incubation, plates were observed for growth. Initially the isolates were identified by colony morphology, gram staining and Catalase, Oxidase enzyme detection tests.⁵⁻⁷ Coagulase enzyme detection test was used to identify and differentiate Coagulase positive Staphylococcus (CoPS), Coagulase negative Staphylococcus (CoNS). Biochemical tests such as Indole, Methyl Red, Voges Proskauer, Citrate utilization, Urease production and growth on Triple Sugar Iron agar were used to identify gram negative bacilli (GNB). After identifying the bacteria, antibiotic sensitivity for CoPS, CoNS and also for GNB was done on Muller-Hinton agar (MHA) by the disk diffusion method.¹⁰ *Escherichia coli*

ATCC 25922, *Staphylococcus aureus* ATCC 25923 were used as controls for GNB and gram positive cocci, respectively.

This study had been approved by institutional ethics committee of GSL Medical College, Rajahmundry and an informed written consent was taken from all the volunteers who participated in the study.

RESULTS

During the study period, 58 samples were collected; 31 samples from male participants and 27 from female participants. The male female ratio was 1.14. Maximum strains were isolated among female; the male (20) female (21) ratio was 0.95 (Table 1).

Table 1: Gender wise normal flora; N (%).

Isolate	Male	Female	Total
No growth	11 (19)	6 (10)	17 (29)
CoPS	5 (9)	7 (12)	12 (21)
CoNS	9 (15.5)	7 (12)	16 (28)
Alfa H strep	2 (3.5)	1 (1.7)	3 (5)
Beta H strep	1 (1.7)	0	1 (1.7)
Non H strep	1 (1.7)	2 (3.5)	3 (5)
Micrococcus	0	2 (3.5)	2 (3.5)
GPB	2 (3.4)	2 (3.5)	4 (7)
Total	31 (53.5)	27 (46.5)	58 (100)

Table 2: Age wise normal flora; N (%).

Age	No growth	CoPS	CoNS	Alfa H	Beta H	Non H	Micro	GPB	Total
0-15	6 (19)	0	0	0	0	0	0	0	6 (10)
16-30	5 (9)	2 (3.5)	1 (1.7)	0	0	0	0	0	8 (14)
31-45	2 (3.5)	1 (1.7)	2 (3.5)	0	0	0	0	2 (3.5)	7 (12)
46-60	3 (5)	4 (7)	5 (9)	2 (3.4)	1 (1.7)	1 (1.7)	1 (1.7)	1 (1.7)	18 (31)
>61	1 (1.7)	5 (9)	8 (14)	1 (1.7)	0	2 (3.4)	1 (1.7)	1 (1.7)	19 (33)
Total	17 (29)	12 (21)	16 (28)	3 (5)	1 (1.7)	3 (5)	2 (3.5)	4 (7)	58 (100)

According to age, 10% strains were isolated in ≤15 years group, 26% in 16-45 years age group and 64% in ≥46 years group; increase in flora was observed with age (Table 2). Among these, CoNS is the predominant isolate followed by *Staph. aureus* (Table 2).

All the CoPS were sensitive to Vancomycin, good sensitivity was identified to Cotrimoxazole (90%), Amikacin (90%). Among CoNS, good sensitivity was identified to Amikacin (90%), Amoxyclav (90%), followed by Pencillin (80%), Ciprofloxacin (80%), Erythromycin (80%), Vancomycin (80%). No significant drug resistance was observed in CoPS and CoNS respectively (Table 3).

Table 3: Antibiotic sensitivity pattern of various isolates.

Organism	Sensitivity pattern
CoPS; n = 12	Pencillin (70%), Ciprofloxacin (80%), Gentamycin (80%), Clindamycin (60%), Cotrimoxazole (90%), Amikacin (90%), Erythromycin (70%), Vancomycin (100%), Amoxyclav (90%).
CoNS; n = 16	Pencillin (80%), Ciprofloxacin (80%), Gentamycin (70%), Clindamycin (60%), Cotrimoxazole (70%), Amikacin (90%), Erythromycin (80%), Vancomycin (80%), Amoxyclav (90%).

DISCUSSION

In this study conjunctival flora was isolated from 41 (71%) participant; CoNS was isolated maximum (28%) followed by CoPS (21%), gram positive bacilli (GPB) (5%) and alpha hemolytic streptococci (5%). A study by Rajvanshi VS on conjunctival swabs found 53% *Staphylococcus albus*, 14.7% *Staphylococcus aureus*, 11.7% Diptheroids and 6.8% *Streptococci*.⁸ Another study by Khoraza and Thompson carried out in normal conjunctiva of 1122 patients found 64% *Staphylococci*.⁹ Another study by Ansari MR et al, reported 52.4% culture positivity, among these 88.8% were CoNS.¹⁰ All the above studies showed that CoNS and CoPS as the predominant flora of conjunctiva. These two microbes are the common resident flora of skin and mucus membrane and are acquired in conjunctiva from the adjacent eyelid or from hand.

But significant disparity was reported regarding the sterile conjunctival sac. In the available literature, 9%, 2.5% and 0% sterile conjunctiva were reported respectively by Chang, Matuura and Locatcher-Khorazo and Seegal.¹¹⁻¹³ Higher percentage of sterile conjunctiva, 24%, 33%, 30% and 47% respectively was reported by Starr and Lally, Bachrach et al, Debnath, Smith.¹⁴⁻¹⁷ Agrawal and Khosla found variation in urban and rural population with 23% and 30% sterile conjunctiva respectively, indiscriminate use of corticosteroid and antibiotic ointments was identified to be the cause for this difference.¹⁸ In the current research, 21.5% participant's conjunctiva was sterile, rural urban difference was not considered. But, when the research team asked, all the participants with sterile conjunctival sac mentioned that they were using ocular antibiotics as per the pharmacist advice.

As per Rao PN et al, report, there was no significant difference between the gender in the isolation of conjunctival flora but there was predominance of fungal isolates among the male.¹⁹ Javed EA et al, reported that flora was isolated from 68.1% male participants and 31.9% female participants; more outdoor activity especially in the agricultural area by the male was reported to be the cause.²⁰ In this study, gender wise (Table 1) there was no difference among the isolates because all the participants were involved in some kind of outdoor activity. This may be the reason for non disparity among the gender.

Sterile conjunctiva was reported to be more in younger age group.^{21,22} In this study also conjunctiva of >60 years was found to be increasingly colonized (Table 2). Singer TR et al, reported 14.9% and 2.2% *Streptococci* isolated, respectively from children and adults (p<0.005).²³ This is because of more colonization of skin and upper respiratory tract with streptococci among children than in adults, which is an important source of conjunctival flora. But in this study, Streptococcus was isolated from adults with >45 years (Table 2).

The isolates have shown good sensitivity to Amoxyclav, Vancomycin, Cotrimoxazole, Ciprofloxacin (Table 3). Among the conjunctival flora, no significant drug resistance was also reported.^{8,21,24}

This is a hospital based study which is not true representation of the community. Hence a community based study with large sample by considering comorbid conditions such as occupation, diabetes, immune status can give authentic data on the conjunctival flora.

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