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ORIGINAL ARTICLE

# A STUDY ON BACTERIOLOGICAL PROFILE OF CONJUNCTIVITIS PATIENTS ATTENDING IN A PERIPHERAL TERTIARY MEDICAL COLLEGE OF WEST BENGAL

Sayantan Mondal[1], Indrajit Gupta[2], Ayan Nandi[3], Gadadhar Mitra[4]

[1-3]Post Graduate Trainee, [4]Professor & HOD, Department Of Microbiology, Burdwan Medical College, Burdwan, West Bengal, India

**ABSTRACT:**
**Background**: Conjunctivitis is the inflammation of the outermost layer of the white part of the eye and the inner surface of the eyelid. It is the most common cause of a red, irritated eye. The most infectious causes of conjunctivitis are viral followed by bacterial. Bacterial infection tends to produce more mucopurulent discharge. The present study aims at knowing the bacteriological spectrum of conjunctivitis and their antibiogram pattern. **Materials and Methods:** The present observational descriptive study was conducted in the department of Microbiology and department of Ophthalmology, Burdwan Medical College and Hospital from April 2015 to October 2015. A total of 113 patients were selected from ophthalmology department, having clinical features of suspected conjunctivitis (red eye, itching, foreign body sensation and discharge from eyes.).Sample processing, isolation, and identification of the bacterial isolates were done as per standard microbiological protocol. Antibiotic susceptibility pattern was performed according to CLSI guidelines using antibiotic discs of ofloxacin (5µg), ciprofloxacin (5µg), amoxicillin (20µg), gentamicin (10µg), vancomycin (30µg), gatifloxacin (5µg), tetracycline (30µg), ceftriaxone (30µg), and penicillin (10units) from Hi-media. **Results**: Out of 113 samples, 54 i.e. 47.69% showed culture positivity. The most common isolated organisms were C*oagulase- negative staphylococcus* (37.04%) followed by *Staphylococcus aureus* (29.63%). Other organisms isolated were *Streptococcus pneumoniae* (5.55%), *Pseudomonas aeruginosa* (14.81%), *Escherichia coli* (11.11%), *klebsiella pneumonia* (1.11%). Analysis of antibiotic susceptibility pattern revealed high degree of resistance prevalent among these isolates. Gatifloxacin (88.89%) and ceftriaxone (81.48%) and vancomycin (94.87%) and gentamicin (86.67%) were found to be most sensitive while tetracycline (73.33%), penicillin (71.80%) showed most resistant to these isolates. **Conclusions:** *Coagulase-negative staphylococci* were the commonest isolate from the samples of patients having bacterial conjunctivitis followed by *Staphylococcus aureus.* Prevalence of gram-positive bacteria was higher than gram negative bacteria. Higher resistance shown by isolates to amoxicillin, penicillin, and tetracycline. Higher prevalence of resistant pathogens indicates injudicious overuse of antibiotics, necessitating implementation of effective antibiotic policy.
Key-words: Conjunctivitis, Gram-positive bacteria, Gram-negative bacteria.

Corresponding author: Dr. Indrajit Gupta, 128/1 G.T.Road, Baidyabati, Kajipara, Dist-Hooghly, West Bengal, Pin-712222., E mail: indrajitgupta.mail@gmail.com

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## INTRODUCTION:

Conjunctivitis is defined as inflammation of the conjunctiva. It is characterized by irritation, itching, foreign body sensation, and discharge from the eyes. Bacterial conjunctivitis may be distinguished from other types of conjunctivitis in presence of a yellow-white mucopurulent discharge. It is categorized by the redness or swelling of the conjunctiva and the membrane that lines the eyelid and eye surface. This membrane is typically clear but when it is infected, it becomes red or pink and swells.

So the common name "pink-eye" since the infected eye appears to be pink.[1]

The most common causes of bacterial conjunctivitis are *Staphylococcus aureus and haemophylus influenza*. Conjunctivitis caused by *Staphylococcus aureus* is often recurrent and associated with chronic blepharoconjunctivitis. [2] The conjunctivae are colonized by *S. aureus* in 3.8% to 6.3% of healthy adults. In addition, about 20% of people normally harbour *S.aureus* continually in the nasal passages and another 60% harbour it intermittently. Other organisms that commonly cause conjunctivitis in adults are *S.pneumonia* , *Coagulase-negative staphylococci*, *Moraxella* and *Acinetobacter* species. [3] In neonates, conjunctivitis is predominantly bacterial and the most common organism is *Chlamydia trachomatis*. This conjunctivitis presents with purulent unilateral or bilateral discharge about a week after birth in children whose mothers have cervical Chlamydia infection. [4] In case of children bacterial conjunctivitis is most often caused by *H influenzae* or *S.pneumonia*e.

## MATERIALS AND METHOD:

The present study was conducted in the department of Microbiology and department of Ophthalmology, Burdwan Medical College and Hospital (BMC&H) from April 2015 to October 2015. A total of 113 patients were selected from ophthalmology departments of BMC&H having clinical features of suspected conjunctivitis (red eye, itching, foreign body sensation and discharge from eyes.). Briefly, patient was requested to look up, lower eye- lid was pulled down and then samples were collected. The sample collector holds the palpebra apart and gently collects discharge from the surface of the eye using sterile cotton swab that has been pre-moistened with sterile saline. The sterile normal saline moistened swab was rubbed over the lower conjunctivae sac from medial to lateral side and back again. [5, 6] The swab was immersed in 3 ml of brain heart infusion (BHI), placed in a cold box and transported to our microbiology Laboratory for investigation.

## RESULTS:

Out of 113 samples collected 54 (47.69%) were culture positive while rest 59 (52.21%) were culture negative. Out of 54 organisms isolated, 20(37.04%) isolates were C*ogulase- negative staphylococci* (CoNS), 16(29.63%) were *Staphylococcus aureus* and 8(14.81%) were *Pseudomonas aeruginosa*. Further, 6 (11.11%) isolates were of *Escherichia coli* and *Streptococcus pneumoniae* 3(5.55%) and *klebsiella pneumoniae* 1(1.85%) were found. The distribution of different isolates from culture positive sample is depicted in table 1 and figure 1.

**Table 1:** Distribution of different isolates obtained from culture (n=54)

| Isolates | Total no. of isolates | Percentage (%) |
|---|---|---|
| **Coagulase-negative staphylococci (CoNS)** | 20 | 37.04% |
| **Staphylococcus aureus** | 16 | 29.63% |
| **Pseudomonas aeruginosa** | 08 | 14.81% |
| **Escherichia coli** | 06 | 11.11% |
| **Streptococcus pneumonia** | 03 | 5.55% |
| **klebsiella pneumoniae** | 01 | 1.85% |
| **Total** | 54 | 100% |

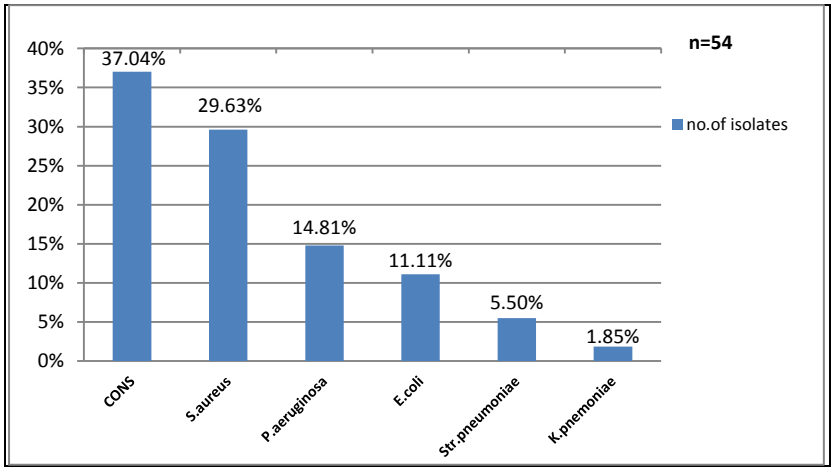


**Figure 1:** Bar diagram showing distribution of different isolates obtained from culture (n=54)

The antibiotic sensitivity pattern of gram positive bacteria showed vancomycin sensitivity to CoNS (90%), *S.aureus* (100%) and for *S.pneumoniae* also(100%).regarding sensitivity of gatifloxacin,the percentage of sensitivity of indivisual isolates CoNS, *S.aureus*, *S.pneumoniae* are 90%, 87.50%, 100 % respectively. For CoNS the sensitivity pattern of penicillin, ofloxacin amoxicillin, ciprofloxacin, ceftriaxone are 70%, 75%, 40%, 85%, and 90% respectively. For *S.aureus* the percentage of sensitivity of penicillin, ofloxacin, amoxicillin, ciprofloxacin, ceftriaxone are 62.50%, 56.25%, 56.25%, 87.50%, 93.75% respectively and for *S.pneumoniae* penicillin, ofloxacin, amoxicillin, ciprofloxacin, ceftriaxone sensitivity percentage are 66.67%, 66.67%, 33.33%, 100%, 100% respectively. This distribution showed in table 2.

The antibiotic sensitivity pattern of gram- negative bacteria showed ceftriaxone sensitivity to *P.aeruginosa* 87.50%,*Escherichia coli* (66.67%) and for *K.pneumoniae* (100%).Regarding sensitivity of gatifloxacin, the percentage of sensitivity of individual isolates *P.aeruginosa*, *Escherichia coli*, *K.Pneumoniae* are 87.50%,83.33%,100% respectively. For *P.aeruginosa* norfloxacin, tetracycline, gentamicin, ciprofloxacin sensitivity pattern are 75%, 25%, 87.50%, 62.50% respectively. For *Escherichia coli* the percentage of sensitivity of norfloxacin, tetracycline, gentamicin, ciprofloxacin are16.67%, 33.33%,83.33%,83.33%% respectively and for *K.pneumoniae* norfloxacin, tetracycline, ciprofloxacin sensitivity percentage 0.00% for all and 100% sensitivity for gentamicin. This distribution showed in table 3. Table 4 and Fig 2 shows overall percentage sensitivity of gram positive bacteria to different antibiotics.

**Table 2:** Antibiotic sensitivity pattern of gram positive bacteria

| Antibiotics | CoNS (20) | S.aureus (16) | S.pneumoniae (3) |
|---|---|---|---|
| **Vancomycin** | 18(90%) | 16(100%) | 3(100%) |
| **Penicillin** | 06(30%) | 04(25.00%) | 01(33.33%) |
| **Ofloxacin** | 15(75%) | 09(56.25%) | 2(66.67%) |
| **Amoxicillin** | 08(40%) | 09(56.25%) | 01(33.33%) |
| **Gatifloxacin** | 18(90%) | 14(87.50%) | 3(100%) |
| **Ciprofloxacin** | 17(85%) | 14(87.50%) | 3(100%) |
| **Ceftriaxone** | 18(90%) | 15(93.75%) | 3(100%) |

**Table 3:** Antibiotic sensitivity pattern of gram negative bacteria

| Antibiotics | Pseudomonas aeruginosa (8) | Escherichia coli (6) | Klebsiella pneumoniae (1) |
|---|---|---|---|
| **Ceftriaxone** | 7(87.50%) | 4(66.67%) | 1(100%) |
| **Norfloxacin** | 6(75.00%) | 1(16.67%) | 0(0.00%) |
| **Tetracycline** | 2(25.00%) | 2(33.33%) | 0(0.00%) |
| **Gentamicin** | 7(87.50%) | 5(83.33%) | 1(100%) |
| **Ciprofloxacin** | 5(62.50%) | 5(83.33%) | 0(0.00%) |
| **Gatifloxacin** | 7(87.50%) | 5(83.33%) | 1(100%) |

**Table 4:** Overall percentage sensitivity of gram positive bacteria to different antibiotics

| Antibiotics | Gram positive bacteria (39) |
|---|---|
| **Ofloxacin** | 66.67% |
| **Ceftriaxone** | 92.31% |
| **Ciprofloxacin** | 81.48% |
| **Gatifloxacin** | 89.74% |
| **Amoxicillin** | 46.15% |
| **Vancomycin** | 94.87% |
| **Penicillin** | 28.20% |

**Table 5:** Overall percentage sensitivity of gram negative bacteria to different antibiotics

| Antibiotics | Gram negative bacteria(15) |
|---|---|
| **Gentamicin** | 86.67% |
| **Ceftriaxone** | 80.00% |
| **Ciprofloxacin** | 61.54% |
| **Tetracycin** | 26.67% |
| **Norfloxacin** | 53.33% |
| **Gatifloxacin** | 86.67% |

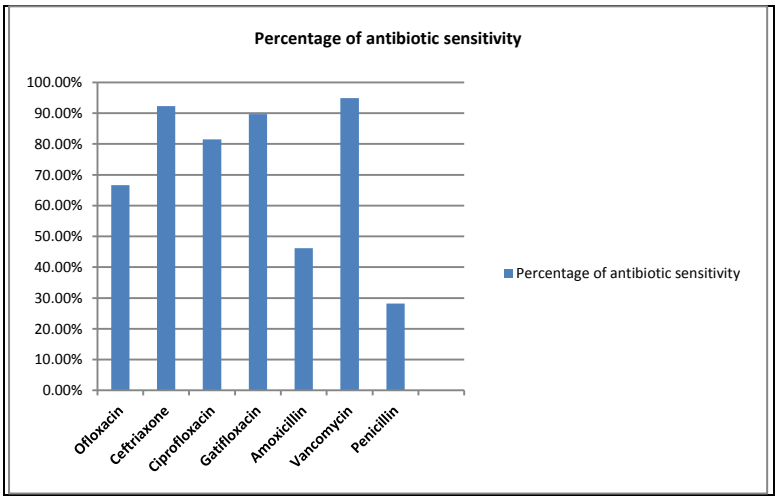


**Figure 2:** Overall percentage sensitivity of gram positive bacteria to different antibiotics:

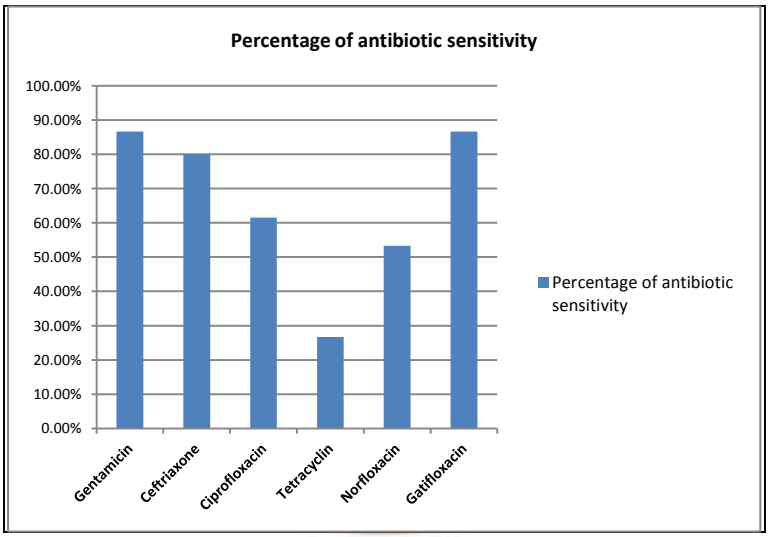


**Figure 3:** Overall percentage sensitivity of gram negative bacteria to different antibiotics

**DISCUSSION:**

In our study, C*ogulase negative staphylococci* (CoNS) was found to be the most frequent pathogen followed by *Staphylococcus aureus* being isolated in 37.04% and 29.63%% respectively. Other organisms isolated were *Pseudomonas aeruginosa* (14.81%), S*treptococcus pneumoniae* (5.55%), *Escherichia coli* (11.11%), *Klebsiella pneumoniae* (1.85 %%). Similar to this study conducted by Zaire R, *et al* who also *reported Cogulase-negative staphylococci* (*32%)* as the most common isolate. [7] The result of our study was very similar to *Ta et al.,* (2009) showed common isolates were CoNS. [8] Haggag *et al.,* (2011) and *De-* Kaspar *et al.,* (2005) demonstrated that CoNS was the most common bacterial organism. [9, 10]

Haggag *et al* [9]. (2011) also found 10.5% *Staphylococcus aureus* as 2nd most frequently isolated bacteria (23.63%) which is similar to our study.

However, in other studies Bharathi MJ *et al.* [11] stated the predominant isolates were *Staphylococcus aureus* followed by S. Pneumoniae. This may be due to the difference in climate and geographical variations in different countries. Other isolates included S. pneumoniae (11.3%), S. pyogene (14.5%), *Escherichia coli* (8.1%), Klebsella spp. (14.5%), and non lactose fermentar gram negative rods (3.2%). These results are consistent with the study by Kasper *et al.*[10]

Regarding antibiotic sensitivity pattern Coagulase negative staphylococci was mostly susceptible (90%) to vancomycin and gatifloxacin in present study. *Coagulase-negative staphylococci* showed low level of sensitivity to Ofloxacin (75%), amoxicillin (40%) and most of the *Coagulase-negative staphylococci* (CoNS) were resistant to penicillin (30%). A study done by Gondar *et al.* [12] also show the similar finding where gatifloxacin is the most sensitive

drug followed by ciprofloxacin and amoxicillin is the most resistant drug.

The sensitivity of *Staphylococcus aureus* isolates to antimicrobials used showed the highest sensitivity to vancomycin (100%) followed by ciprofloxacin(87.50%), ceftriaxone with percentage (90.00%) while the proportion was less sensitive to ofloxacin with percentage (56.25%%) and amoxicillin(56.25%). This result is consistent with the previously studies done by Olatunji FO *et al.*[13]

It is well known fact that most S. aureus strains produce pencillinase and alternative penicillin binding proteins (PBP-2A) helps the organisms to become resistant to most beta-lactam antibiotics. [14] In this study, most of bacterial isolates have shown high resistance to Ofloxacin (66.67%), penicillin (28.20%), amoxicilin (46.15%).

A study done by Tenover FC et al. [15] showed the similar findings and reported that indiscriminate use of antibiotics as the reason for drug resistance in microbial population while ceftriaxone (90%) and ciprofloxacin (87.50%) showed susceptibility. Another study done by Tesfaye T *et al.* [16] where Penicillin showed resistance of 80-90% similar to our study where penicillin showed 72% resistance .

Most of Gram negative isolates were sensitive to gentamicin (n = 15; 86.67 %) but resistant to tetracycline, norfloxacin and ciprofloxacin. A study done by Biradar S et al in their reports also showed similar patterns of drug resistance among Gram negative bacteria.[17,18] Both Gram positive cocci and Gram negative bacilli were highly susceptible to gatifloxacin, ciprofloxacin, ceftriaxone. Another study from South India which shows sensitivity of gatifloxacin (83.8%) which is similar to our study.[19]

Frequent isolation of drug resistant bacteria might be due to an irrational use of antimicrobial agents. In India, it is a common practice that antimicrobials can be purchased without prescription, which leads to misuse of antibiotics. This may contribute to the emergence and spread of antimicrobial resistance.[20]

## CONCLUSIONS:

The above descriptive study showed that *Coagulase-negative staphylococci* (CoNS) were the commonest isolates from the samples of patients having bacterial conjunctivitis followed by *Staphylococcus aureus.* Gatifloxacin and ceftriaxone were the most sensitive to pathogen isolated and they seemed to be given best coverage for both gram positive and gram negative bacteria. Higher prevalence of resistant pathogens indicates injudicious overuse of antibiotics, necessitating implementation of effective antibiotic policy. This necessitates further study of resistant pathogens with molecular characterization like DNA probing, polymerase chain reaction, restriction fragment length polymorphism and isoelectric focusing.

Regular surveillance will show changes in the organism distribution, antibiotic sensitivity patterns and MICs of the commonly used drugs. This will help in formulating a working antibiotic policy for our hospital which will aid the clinician in prescribing proper antibiotics. In this way, with the prevention of rampant indiscriminate use of antibiotics, there is a possibility that a restricted use can lead to the withdrawal of the selective pressure and that the resistant bacteria will no longer have a survival advantage in such setting.

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