ANTIBIOTIC SUSCEPTIBILITY PATTERNS OF CONJUNCTIVAL BACTERIAL ISOLATES AMONG PATIENTS UNDERGOING CATARACT SURGERY

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- METHODOLOGY
- ETHICAL CONSIDERATION
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INTRODUCTION

- Cataract is an increasingly common cause of global blindness, particularly in developing countries with an aging population and insufficient health care resources\(^1\)
- It is also common in Asia and has been documented in rural Myanmar\(^2\)
INTRODUCTION (Cont;)

- Although there have been tremendous advances in the efficiency and outcomes of cataract surgery over the last 3 decades, cataract is still the leading cause of vision loss worldwide\(^1\)

- The existence of bacterial flora in apparently healthy conjunctiva is suggested that it is the commonest source of post-operative infection\(^3\)
INTRODUCTION (Cont;)

- External ocular flora from patient may gain entrance into the posterior chamber of eye during surgery.
- About 90% of isolates were gram positive and 10% were gram negative bacteria.
In a study by Cham, Valenton & Lim\(^5\), of the 30 patients undergoing routine cataract surgery, 90.0% of swab samples were culture positive.

The most common organism was *Staphylococcus epidermidis* (89.0%) followed by *Bacillus* species (44.0%) and *Staphylococcus aureus* (12.0%).
In a study by Mshangila, et al.\textsuperscript{6} from Uganda, among 131 patients of pre-operative cataract surgery, conjunctival samples were culture positive in 45.8\% and the common organisms identified were coagulase negative staphylococci (CoNS) (65.9\%) and \textit{Staphylococcus aureus} (21.0\%).
INTRODUCTION (Cont;)

- In a study by Pyae Phyo Aung\textsuperscript{7}, among 100 eyes undergoing cataract surgery in Yangon, 58.0\% of conjunctival swabs samples were culture positive.
- Coagulase negative staphylococci were isolated most frequently (53.0\%), followed by \textit{Staphylococcus aureus} (31.0\%), \textit{Pseudomonas} species (9.0\%) and \textit{Klebsiella pneumoniae} (7.0\%).
Cataract surgery is one of the most common elective surgeries performed in the developed world.

Because of advances in technique and technology, cataract surgery in developed nations is regarded by many patients as a minor procedure only needing a short recovery time and having outstanding results.
But there may be complications of cataract surgery including posterior capsule opacity, intraocular lens dislocation, post-operative infections, light sensitivity, macular oedema, ptosis and increased intraocular pressure
Therefore, an infection after this elective procedure is especially devastating since it can lead to permanent vision loss and loss of the eye in severe cases.
INTRODUCTION (Cont;)

- In Korea, Kim, et al.\textsuperscript{9} found that \textit{Staphylococcus epidermidis} was the most common organism in post-operative ocular infections (67.0\%), followed by \textit{Staphylococcus aureus} (11.0\%), \textit{Enterococcus} (11.0\%), \textit{Streptococcus pneumoniae} (11.0\%)
INTRODUCTION (Cont;)

- In reports from India, *Pseudomonas* species and fungi were the common organisms associated with post-operative ocular infections\(^{10,11}\)

- In Myanmar, *Pseudomonas* species and *Staphylococcus* species were common organisms in post-operative infections after cataract surgery\(^{12}\)
INTRODUCTION (Cont;)

- The ophthalmologists use many pre and post-operative methods to prevent post-operative infections including installation of topical antibacterial eye drops, subconjunctival injections or intracameral injections of antibacterials, installation of 5-10% povidone-iodine.
The most common of which is the use of topical antibiotic drops at regular intervals\textsuperscript{13}

Use of prophylactic antibiotics in cataract surgery reduces the number of organisms in the conjunctiva and eyelids and thus, reduces the risk of post-operative infections\textsuperscript{14}
INTRODUCTION (Cont;)

- Ophthalmologists have several classes of topical antibacterial to choose including aminoglycosides, fluoroquinolones, sulfonamides, macrolides
- In the United States of America, the most commonly used pre-operative topical antibiotics are fluoroquinolones especially moxifloxacin and gatifloxacin
INTRODUCTION (Cont;)

- In India, they mostly use ciprofloxacin
- Late-generation fluoroquinolones penetrate the cornea well and achieve measurable concentrations in the anterior chamber aqueous fluid
A study done by Jyoti, *et al.* \(^3\), result of antibiotic sensitivity testing revealed that coagulase negative staphylococci isolates were showed 100% sensitivity against vancomycin, amikacin and imipenem and higher resistance against azithromycin, penicillin, cotrimoxazole and cefixime.
INTRODUCTION (Cont;)

- In Egypt study by Elborgy, Fahmy & Mostafa\textsuperscript{15}, antibiotic sensitivity test to conjunctival microbiota from patients submitted to cataract surgery revealed that the highest antibiotic resistance was exhibited against ceftazidime (100\%), followed by clindamycin (86.0\%), ampicillin (80.5\%), erythromycin (72.2\%) and tetracycline (69.4\%).
In Myanmar, a study in Yangon by Pyae Phyo Aung showed that *Staphylococcus aureus* was sensitive to neomycin (89.0%), moxifloxacin (83.0%), tobramycin (67.0%), ciprofloxacin and lomefloxacin (61.0%), vancomycin (44.0%) and gentamycin (39.0%)
INTRODUCTION (Cont;)

- Coagulase negative staphylococci were sensitive to moxifloxacin and vancomycin (100%), neomycin and tobramycin (97.0%), gentamycin (84.0%), ciprofloxacin (71.0%) and lomefloxacin (65.0%)
INTRODUCTION (Cont;)

- It is suggested that there are bacterial flora in apparently healthy conjunctiva and lid margin which can cause post-operative infections after cataract surgery
To effectively prescribe empiric antibiotics, it is important to know a profile of potential pathogens in a local community because the choice for the prophylactic topical antibiotic is influenced by the spectrum of bacteria covered.
INTRODUCTION (Cont;)

- Therefore, understanding the spectrum of the ocular flora and their antibiotic susceptibility patterns in local geographic area can assist eye surgeons in optimizing prophylactic antibiotic treatments.
- This study was conducted to determine the antibiotic susceptibility patterns of conjunctival bacterial isolates.
METHODOLOGY

Study Design

- Hospital based cross-sectional descriptive study

Study Site

- Eye Units of Eye, Ear, Nose and Throat Hospital, Mandalay
METHODOLOGY (Cont;)

Study Period
- From 1\textsuperscript{st} January 2018 to 30\textsuperscript{th} September, 2018

Study Population
- Patients attending for cataract surgery in Eye, Ear, Nose and Throat Hospital, Mandalay
Inclusion criteria
All patients who undergoing cataract surgery before giving any antibiotic treatment from hospital

Exclusion criteria
Patients with any active ocular infection
METHODOLOGY (Cont;)

- Disposable swab with Stuart transport medium tube was used for specimen collection

Stuart transport medium
METHODOLOGY (Cont;)

- Each specimen
  - labeled with participant’s name, age, sex, date and time of specimen collection
  - transported to laboratory of Department of Microbiology, University of Medicine, Mandalay
  - processed within two hours after collection
METHODOLOGY (Cont;)

Flow Chart

Collection of conjunctival swabs from patients undergoing cataract surgery after informed consent before routine antibiotic treatment from hospital

Direct microscopic examination & Inoculation of specimen on culture media and incubation at 37°C overnight

Examination of colonial morphology and microscopic examination of Gram-stained smear on next day

Gram positive bacteria

Gram negative bacteria
METHODOLOGY (Cont;)

Gram positive bacteria

Identification of gram positive bacteria by routine biochemical reactions

Gram negative bacteria

Identification of gram negative bacteria by routine biochemical reactions

Antibiotic susceptibility test for each isolated bacteria by modified Kirby-Bauer method

Data analysis
METHODOLOGY (Cont;)

Growth of *Staphylococcus aureus* on mannitol salt agar and antibiotic susceptibility pattern of isolated *Staphylococcus aureus*
METHODOLOGY (Cont;)

Growth of *Escherichia coli* on MacConkey agar and antibiotic susceptibility pattern of isolated *Escherichia coli*
ETHICAL CONSIDERATION

- This study was approved by the Ethical Review Committee of University of Medicine, Mandalay
One hundred and fifty patients, 49 male patients and 101 female patients were included in the present study. The most common age group was 61-70 years age group.
RESULTS AND DISCUSSION (Cont;)

![Bacterial Growth Diagram]

- Growth: 55.3%
- No growth: 44.7%

![Additional Diagram]

- Single growth: 86.6%
- Mixed growth: 13.4%
RESULTS AND DISCUSSION (Cont.;)

- Similarly, bacterial growth rate was found 47.6% in a study by Jyoti, et al.\textsuperscript{3} from North India.
- A lower incidence of conjunctival flora than the finding of Cham, Valenton & Lim\textsuperscript{5}, who observed that the positive bacterial culture was 90%.
RESULTS AND DISCUSSION (Cont;)

- The growth rate of bacteria and different results of culture may be greatly attributed to various factors such as environment, demography, climate, race.
- Furthermore, the use of local anesthetic might be contributory factor to this result.
- Because local anesthetic eye drop, 0.5% proparacaine used in this study, has antibacterial property.
## RESULTS AND DISCUSSION (Cont;)

Distribution of isolated bacteria from conjunctiva of patients undergoing cataract surgery

<table>
<thead>
<tr>
<th>Isolated bacteria</th>
<th>No. of isolates</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulase negative staphylococci</td>
<td>37</td>
<td>48.7%</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>19</td>
<td>25.0%</td>
</tr>
<tr>
<td><em>Pseudomonas</em> species</td>
<td>8</td>
<td>10.5%</td>
</tr>
<tr>
<td><em>Klebsiella</em> species</td>
<td>8</td>
<td>10.5%</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>3</td>
<td>4.0%</td>
</tr>
<tr>
<td><em>Citrobacter</em> species</td>
<td>1</td>
<td>1.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION (Cont;)

- In the present study, coagulase negative staphylococci were identified as the most frequently isolated bacteria among the conjunctival microbial flora (48.7%) which was agreed with many others studies.

- Therefore, antibiotic susceptibility patterns of CoNS were important to know to reduce the rate of post-operative infection.
RESULTS AND DISCUSSION (Cont;)
Antibiotic susceptibility patterns of isolated coagulase negative staphylococci (n=37)

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Sensitive</th>
<th>Intermediate</th>
<th>Resistant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>16</td>
<td>43.3%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>19</td>
<td>51.4%</td>
<td>2</td>
<td>5.4%</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>33</td>
<td>89.2%</td>
<td>2</td>
<td>5.4%</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>33</td>
<td>89.2%</td>
<td>1</td>
<td>2.7%</td>
</tr>
<tr>
<td>Oxacillin</td>
<td>12</td>
<td>32.4%</td>
<td>1</td>
<td>2.7%</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>27</td>
<td>73%</td>
<td>8</td>
<td>21.6%</td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION (Cont;)

- Moxifloxacin eye drops should be given as prophylactic antibiotic before cataract surgery to reduce the load of CoNS from conjunctiva of patients
RESULTS AND DISCUSSION (Cont;)

Antibiotic susceptibility patterns of isolated *Staphylococcus aureus* (n=19)

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Sensitive</th>
<th>Intermediate</th>
<th>Resistant</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>10</td>
<td>52.6%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>47.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>11</td>
<td>57.9%</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>36.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(MRSA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clindamycin</td>
<td>16</td>
<td>84.2%</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>15</td>
<td>78.9%</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>15.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxacillin</td>
<td>7</td>
<td>36.8%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>63.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancomycin</td>
<td>17</td>
<td>89.4%</td>
<td>1</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>5.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 19 (100%)
RESULTS AND DISCUSSION (Cont;)

- *Staphylococcus aureus* can also cause severe post-operative ocular infection that run aggressive course leading to sight loss.

- For control of *Staph. aureus* colonization, moxifloxacin should be chosen as a prophylactic eye drop.
RESULTS AND DISCUSSION (Cont;) 

- But, according to this study, azithromycin eye drop should not be used no longer because sensitivity to azithromycin of *Staph. aureus* was reduced which may be the consequences of widespread use of this eye drop.
RESULTS AND DISCUSSION (Cont;)
Antibiotic susceptibility patterns of isolated Enterobacteriaceae (n=12)
RESULTS AND DISCUSSION (Cont;)

- For prevention of Enterobacteriaceae related post-operative infection, moxifloxacin should be chosen as prophylactic eye drops before cataract surgery according to the result of this study.
- Amoxicillin-clavulanic acid and cefazolin should not be used as prophylactic drugs because their sensitivity to Enterobacteriaceae were very low.
RESULTS AND DISCUSSION (Cont;)

Antibiotic susceptibility patterns of isolated *Pseudomonas* species (n=8)
RESULTS AND DISCUSSION (Cont;)

- In the present study, levofloxacin showed good sensitivity against *Pseudomonas* species and it should be given as prophylactic antibiotic.
- But neomycin and tobramycin should not be used because they cannot effectively reduce the *Pseudomonas* species colonization according to the result of this study.
CONCLUSION

- Infections caused by multidrug resistant bacteria are not only threatened to get the full vision but also difficult to treat.
- Thus, to reduce the rate of post-operative infections, proper use of antimicrobial drugs is necessary.
CONCLUSION (Cont;)

- Moxifloxacin which is currently used eyedrop in ophthalmology units were found to be the most susceptible antibiotic against conjunctival bacterial isolates except *Pseudomonas* species
- Levofloxacin showed good activity against *Pseudomonas* species
Therefore, to effectively control the colonization of conjunctival bacterial isolates, only one class of eye drop will not be sufficient.

For patients who have mixed conjunctival flora, combined antibiotics should be used.
REFERENCES


REFERENCES (Cont;)


REFERENCES (Cont;)


REFERENCES (Cont;)


REFERENCES (Cont;)


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