INTRODUCTION

Contact lens (CL) cases become contaminated with microbes during use [1,2]. Microbial contamination of CL cases may result in biofilm formation [3]. Bacteria within a biofilm are less susceptible to antimicrobials and multipurpose contact lens disinfection solutions [4]. The biofilm can then serve as a source of bacteria to contaminate contact lenses during storage [5].

AIM

To evaluate bacterial transmission to worn contact lenses from biofilms in contact lens storage cases during disinfection.

METHODS

- Forty two experienced contact lens wearers aged 22-24 years were recruited.
- Etafilcon A or senofilcon A contact lenses worn for up to 8 hours were collected.
- Biofilms of Pseudomonas aeruginosa 071 or Staphylococcus aureus 031 were grown in lens cases for 24 hours.
- Worn and unworn lenses were placed in biofilm laden lens storage cases and disinfected with a contact lens disinfection solution containing Povidone-Iodine (PI) (cleadew. Optiecs Corporation, Japan) for 4 hours.
- The number of bacteria in lens storage cases and contact lenses was estimated by culture.

RESULTS

<table>
<thead>
<tr>
<th>Bacterial Counts (Log_{10} CFU)</th>
<th>CL</th>
<th>SL</th>
<th>CL</th>
<th>SL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Storage Cases</td>
<td>8.0</td>
<td>7.6</td>
<td>5.6</td>
<td>4.1</td>
</tr>
<tr>
<td>Disinfected Storage Cases</td>
<td>4.9</td>
<td>4.3</td>
<td>5.9</td>
<td>4.0</td>
</tr>
<tr>
<td>with unworn CL</td>
<td>4.9</td>
<td>4.3</td>
<td>5.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Disinfected Storage Cases</td>
<td>4.9</td>
<td>4.3</td>
<td>5.9</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Figure 1: Number of bacteria (Mean ± SD) isolated from contact lens storage cases

* p<0.05 - Compared to Untreated Cases; # p<0.05 - Compared to cases with worn contact lenses

<table>
<thead>
<tr>
<th>Bacterial Counts (Log_{10} CFU)</th>
<th>CL</th>
<th>SL</th>
<th>CL</th>
<th>SL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unworn</td>
<td>3.6</td>
<td>3.6</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Worn</td>
<td>3.6</td>
<td>3.6</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>etafilcon A</td>
<td>3.5</td>
<td>3.5</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>senofilcon A</td>
<td>3.8</td>
<td>3.8</td>
<td>2.5</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Figure 2: Comparison of bacterial transmission (Mean ± SD) to etafilcon A and senofilcon A contact lenses from biofilms in lens storage cases during disinfection

* p<0.05 - unworn Vs. worn lenses; # p<0.05 etafilcon A Vs. senofilcon A

CONCLUSION

Cleadew disinfected storage cases had significantly less viable P. aeruginosa (-2.5 log_{10} CFU) and S. aureus (-3.5 log_{10} CFU; Figure 1).
- Significantly more P. aeruginosa (Figure 1) remained in storage cases disinfected in the presence of worn contact lenses.
- 5% of the bacteria were transmitted to the contact lenses from storage cases during disinfection.
- Worn senofilcon A lenses bound significantly more P. aeruginosa (1.1 log_{10} CFU) than unworn senofilcon A and worn etafilcon A lenses (1.0 log_{10} CFU; Figure 2).
- Worn etafilcon A lenses bound significantly less S. aureus (-1.4 log_{10} CFU) compared to unworn lenses (Figure 2).

REFERENCES


ACKNOWLEDGEMENTS

The authors would like to thank the Opticles Corporation for providing the solutions and lens cases free of charge.

Email: v.ajaykumar@unsw.edu.au