Antimicrobial efficacy of silver contact lens cases used in conjunction with a multipurpose disinfecting solution containing hyaluronic acid

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Introduction

- Contact lens storage cases are frequently contaminated during use with up to 90% of all contact lens storage cases contaminated.1,2
- Contamination of contact lens storage cases can lead to biofilm formation.3
- Bacterial biofilms can serve as a source of bacteria contaminating contact lenses during storage4 that can then transfer to the cornea during wear.5
- Adhesion of bacteria to contact lenses is a major risk factor for the development of infectious6 and inflammatory keratitis.7
- Laboratory studies have shown that contact lens cases containing silver can reduce the number of bacteria and biofilm formation.8,9
- However, very few clinical studies have examined the efficacy of contact lens cases containing silver in reducing bacterial contamination during normal use of lens cases by contact lens wearers.10

Purpose

The purpose of this study was to compare the microbial contamination between silver-impregnated contact lens cases and non-silver contact lens storage cases.

Methods

- A prospective, single-center, randomised, single masked clinical trial was conducted.
- The study received ethics approval (HREC#190910) from the UNSW Human Research Ethics Committee and the trial was registered with the Australia and New Zealand Clinical Trial Registry (ACTRN12619001520123).
- 2 types of contact lens storage cases were used
  - Silver impregnated lens cases
  - Standard (non-silver) contact lens cases
- Single contact lens multipurpose disinfecting solution (MPS) containing polyhexamethylene biguanide and hyaluronic acid (Hy-Care®, CooperVision, Inc., Pleasanton, USA) was used.
- Habitual contact lens wearers using two weekly or monthly replacement contact lenses were included in the study.
- Participants were randomised to either use the silver impregnated or standard lens case for 3 months and crossed over to use the other lens case type for next 3 months.

Results

- At the follow up visit (1-month, 3-month, 4-month and 6-month), used lens storage cases were collected and cultured to recover bacteria and fungi.
- Chi-squared test was used to compare the microbial contamination between silver-impregnated contact lens cases and standard contact lens storage cases.
- Twelve participants with a mean age of 32 ± 10 years were recruited, 67% of them were female.
- Ten participants completed the study.
- One participant had to be discontinued from the study due to non availability for the follow up visits.

Table 1: Number of microbes in silver-impregnated and standard lens case (colony forming units/case)

<table>
<thead>
<tr>
<th>Type of Microbes</th>
<th>Silver lens case (Mean ± SD)</th>
<th>Standard lens case (Mean ± SD)</th>
</tr>
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<tbody>
<tr>
<td>Gram positive bacteria</td>
<td>1 ± 2 x10³</td>
<td>14 ± 72 x10³</td>
</tr>
<tr>
<td>Gram negative bacteria</td>
<td>30 ± 72 x10³</td>
<td>3018 ± 4857 x10³</td>
</tr>
<tr>
<td>Fungus</td>
<td>1 ± 3</td>
<td>5 ± 10</td>
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Figure 1: Contamination of silver-impregnated and standard lens case

Figure 2: Frequency of lens case contamination by types of microbes

Conclusion

Silver-impregnated contact lens storage cases used in conjunction with a MPS containing hyaluronic acid showed reduction in microbial contamination of the lens cases compared to standard contact lens storage cases.

References


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- All the study participants.
- *, not currently available in the USA

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