**BACKGROUND**

- Microbial contamination of contact lens (CL) storage cases is associated with both sterile and microbial keratitis, including bacterial and Acanthamoeba disease and the causative organism in microbial disease may be recovered from the CL storage case.
- Water exposure during CL handling and care can transfer environmental microorganisms, including Gram-negative bacteria to the CL storage case.
- Despite the documented risks, water-related habits are common amongst CL wearers. Unequivocal, practical, and consistent safety information to avoid water exposure may reduce CL case contamination and associated risk of CL-related adverse events.

**PURPOSE**

To determine the effect of water education on the endotoxin levels and overall storage case contamination in community-based CL lens wearers.

**METHODS**

- A randomised, double-masked, intention-to-treat 6 weeks clinical trial; 200 CL wearers using frequent replacement lenses enrolled following informed consent (UNSW HREC approval #HC176735).
- Subjects completed the following at the baseline and 6 week follow-up visits (Figure 1):
  - Self-administered questionnaire on water contact behaviour as they last used lenses.
  - A water exposure scoring system devised to determine the overall water exposure during CL wear (excellent: R; poor).
  - CL storage cases collected and analysed for total microbial contamination and endotoxin levels.
- Total microbial contamination
  - 1 ml of 1% Luria broth in PBS was added to one of the case wells and the biofilm removed using a magnetic bar.
  - An ATP assay (Bacti-Glo™, Promega, Sydney, Australia) determined the overall microbial bioburden and a standard curve based on previous method development works.
- Endotoxin levels
  - 1 ml of sterile lysozyme solution was added to the other case well and the biofilm removed using a magnetic stirring bar.
  - The limulus amebocyte lysate assay (Pyrochrome™, Associated of CapeCod, Liverpool, UK); determined endotoxin levels and were categorized as low (≤2 EU/ml) or high (>2 EU/ml).
- A one-way analysis of covariance (ANCOVA) determined group differences at the follow-up visit for overall water exposure score and total CL storage case contamination.
- Logistic regression (baseline measures as covariates) determine the effect of water education on the endotoxin levels.

**STATISTICAL ANALYSIS**

- A one-way analysis of covariance (ANCOVA) determined group differences at the follow-up visit for overall water exposure score and total CL storage case contamination.
- Logistic regression (baseline measures as covariates) determine the effect of water education on the endotoxin levels.

**RESULTS**

- 188 CL wearers including 128 females (68%) and 60 males (32%) completed the study; average age 29 ± 13 (range 18 to 78 years). 60 participants at the test and 93 in control groups.
- The endotoxin levels were significantly reduced in the test group participants at the follow-up visit, compared to the control group when controlling for the baseline measurements (p<0.020) (Figure 2)
- The overall water exposure score was significantly lower in the test group compared to the control group at the follow-up visit, controlling for the baseline measurements (p=0.005, one-way ANCOVA) (Table 1).
- Average microbial contamination level of CL storage cases were reduced for both groups at the follow-up visit with non-significant group differences (p=0.173; one-way ANCOVA) (Table 1).

**DISCUSSION**

- Participants using the “no water” stickers on the lens storage case had lower endotoxin contamination of the storage cases, compared to those using only the written instructions, suggesting a link between water exposure and Gram-negative storage case contamination, as described in previous studies. 4,5
- Overall water contact behaviour was improved in those participants using the “no water” stickers, compared to those using only the written instructions. These findings agree with previous studies reporting a positive impact of visual infographics on health compliance.
- Higher microbial case contamination was moderately associated with higher water contact. Increased tap water exposure has been previously associated with increased Gram-negative storage case contamination. 5

**CONCLUSION**

- The inclusion of “no water” stickers on contact lens storage cases reduced the endotoxin levels in storage case contamination and improved the overall water-contact behaviour of contact lens wearers.
- There were no significant changes in the overall level of storage case contamination.
- It is critical to understand the impact of these visual infographics on long term behavioural modifications, to reduce the risk of contact lens-related adverse events.

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**REFERENCES**


**CONTACT:** M.Ashraf@unsw.edu.au