

Microbial contamination of soft contact lenses & accessories in asymptomatic contact lens users

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Background & objectives: With increasing use of soft contact lenses the incidence of contact lens induced infections is also increasing. This study was aimed to assess the knowledge of new and existing contact lens users about the risk of microbial contamination associated with improper use and maintenance of contact lenses, type of microbial flora involved and their potential to cause ophthalmic infections.

Methods: Four samples each from 50 participants (n=200) were collected from the lenses, lens care solutions, lens care solution bottles and lens cases along with a questionnaire regarding their lens use. The samples were inoculated onto sheep blood agar, Mac Conkey's agar and Sabouraud's dextrose agar. Organisms were identified using standard laboratory protocols.

Results: Overall rate of microbial contamination among the total samples was 52 per cent. The most and the least contaminated samples were found to be lens cases (62%) and lens care solution (42%), respectively. The most frequently isolated contaminant was *Staphylococcus aureus* (21%) followed by *Pseudomonas* species (19.5%). Majority (64%) of the participants showed medium grade of compliance to lens cleaning practices. Rate of contamination was 100 and 93.75 per cent respectively in those participants who showed low and medium compliance to lens care practices as compared to those who had high level of compliance (43.75%) ($P<0.05$).

Interpretation & conclusions: Lens care practices amongst the participants were not optimum which resulted into high level contamination. Hence, creating awareness among the users about the lens care practices and regular cleaning and replacements of lens cases are required.

Key words Contact lenses - disinfection - keratitis - lens care accessories - microbial contamination - questionnaire

Contact lenses, especially the soft contact lenses are increasingly being used for cosmetic or therapeutic purposes. Lack of compliance and poor hygiene towards lens care is strongly associated with microbial

contamination and has been proved to result in eye infections^{1,2}. Microbial keratitis is one of the serious complications of contact lens use and if not treated timely, may result in permanent visual damage to

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the cornea. In developed countries, the incidence of contact lens associated keratitis has been increased up to 30 per cent of all keratitis cases^{3,4}. The present study was planned to assess the knowledge of young medical and dental students who were using contact lens about the risk of microbial contamination associated with improper use and maintenance of contact lenses, type of microbial flora involved and their potential to cause ophthalmic infections.

Material & Methods

The study was conducted at Acharya Vinoba Bhave Rural Hospital (AVBRH) and Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha, Maharashtra, India, during April-May 2012. Fifty medical and dental students who were asymptomatic contact lens users and who volunteered to be included in the study, were asked to fill a questionnaire containing details of lens use and six steps of lens cleaning and storing protocol. Those who followed five or more steps, three or four steps and less than three steps were classified as belonging to high, medium and low compliance groups, respectively. The study protocol was approved by the Institutional Ethics Committee and each participant gave written informed consent.

One sample each were collected from concave surface of contact lenses, lens case and tip of solution bottles with the help of sterile cotton tipped swabs that were pre-moistened with sterile brain heart infusion (BHI) broth. Sample of lens care solution was directly cultured on solid media as a drop. All samples were inoculated onto 5 per cent sheep blood agar, Mac

Conkey's agar and Sabouraud's dextrose agar. The blood agar and Mac Conkey's agar were incubated at 37°C for 24-48 h, while Sabouraud's dextrose agar was incubated at 25°C and examined daily for growth of fungi and discarded at the end of three weeks. Organisms grown were identified using standard microbiological techniques⁵.

The data obtained were analyzed in terms of percentage contamination obtained, type of microbial flora involved and its relation with the lens care practices followed by the users using Fisher Exact test.

Results & Discussion

Thirty seven (74%) participants showed growth of organisms in at least one of the samples. Overall rate of microbial contamination among the total samples was 52 per cent (104/200). Lens case was the most contaminated sample (62%) followed by lenses (56%), tip of solution bottles (48%) and lens care solution (42%). All 104 contaminated samples grew bacteria on culture (Figure). None of the sample was positive for fungus. *Pseudomonas* species predominated in lenses (28%), against *Staphylococcus aureus* in lens cases (30%), bottles (24%) and lens care solutions (18%). Our study showed significantly higher rate of microbial contamination ($P<0.05$) among those who showed medium to low compliance to the lens cleaning protocol in comparison to high compliance group as shown earlier by Tuli *et al*⁶. Rates of contamination in low, medium and high compliance groups were 100, 93.75 and 43.75 per cent, respectively. Of the 50 participants, 32 were occasional users, 36 were using

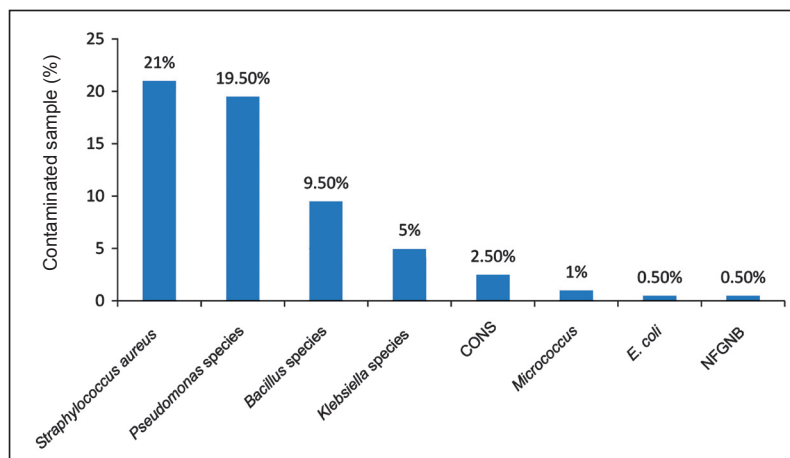


Fig. Microbiological profile of contaminated samples. CONS, coagulase negative *Staphylococcus*; NFGNB, Nil fermenter Gram-negative bacilli.

Table. Per cent distribution of contaminated samples according to the frequency, duration and reason for contact lens use

	Parameter	Total participants	Participants with contaminated samples No. (%)
Frequency of use	Daily	18	15 (83)
	Occasional	32	21 (65)
Duration of use (yr)	≥ 2	36	27 (75)
	< 2	14	12 (85)
Reason of use	Cosmetic	18	16 (88)
	Therapeutic	32	23 (71)

contact lens for >2 yr, and 18 were using for cosmetic purpose (Table).

Increased rate of contamination was seen among daily users (83%) and those using lenses for purely cosmetic purposes (88%) reflecting carelessness and lack of compliance on the part of the users regarding lens care. The total rate (74%) of microbial contamination in our study was similar to the studies by Lipener *et al*⁷ (86.6%) and Emina *et al*⁸ (70.27%). Lens cases were the most frequently contaminated item (62%) followed by contact lenses as also found by others^{7,9-12}.

Although *Pseudomonas* has been reported as the most frequent isolate from lenses and accessories^{3,7,13}, *S. aureus* was found to be the predominant isolate in our study. Yung *et al*⁹, have also found *S. aureus*, coagulase-negative staphylococci and *Serratia* species as the most common microorganisms.

In conclusion, our preliminary results showed that the lens care practices amongst the participants were not optimum resulting in high level contamination. Increased awareness among the users about the lens care practices and regular cleaning and replacements of lens cases and solutions are warranted.

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