Vol 5 (1), January 2014; 05-08

Keratitis Causing Micro-Organisms Isolated from Ophthalmic Contact Lens Solutions

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ABSTRACT

This study aimed to determine the disinfecting potential of some contact lens solution used by the students of Jinnah University for Women. We investigated the possible contaminating rate and identified microbial contamination. 25 samples were collected in this study. Were used Multipurpose disinfecting solutions with protein remover of different companies. We have isolated 43 strains among which 20 were Gram positive and 23 were Gram negative. ***S.aureus*****, Pseudomonas Serratia was most common organisms isolated i.e. 26%, 16% & 14% respectively. All isolated strains were resistant to antibiotic used in this study except Bacillus which gives intermediate-resistant to streptomycin.**

Keywords: Contact lens, Contamination, Disinfection, Microorganisms

INTRODUCTION

Besides having optical, protective and therapeutic significance, contact lenses are widely used as cosmetic aids by the new generation (Kumar, 1985). The contact lens industry has grown rapidly over the past four decades due to the widespread demands of the population for a convenient alternative to spectacle wear for the correction of myopia. Unfortunately, many people who wear contact lenses are not aware of the potential risks associated with them, and consumer education about lens care has not been adequate (Levey *et al*., 1996). Most contact lens-related infections are often associated with inadequate contact lens hygiene, and therefore, contact lens care products should be able to sufficiently minimize the amount of pathogens that are responsible for these infections (Hildebrandt *et al*., 2012). The widespread use of contact lenses has resulted in an increased incidence of microbial keratitis (Wilson *et al*., 1981; Weismann et al., 1984; Alfonso *et al*., 1986; Moore *et al*., 1987). There are approximately 125 million contact lens wearers globally (Wu *et al*., 2010). Corneal ulcers are a major cause of vision loss worldwide (Sharma *et al*., 2007). The rate of progression of microbial keratitis is dependent on the virulence of the offending pathogen and host factors (Ahn *et al*., 2011; AAO, 2008). *Pseudomonas aeruginosa*, one of the most common pathogens in CLMK, is highly destructive and difficult to neutralize. Another highly common pathogen in CLMKi.e. Staphylococcus, may account for 45% of all bacterial keratitis (Ahn *et al*, 2011; Giraldez *et al*., 2010).

Enterobacter, Serratia and Klebsiella species which are usually of faecal origin can be transferred to the disinfectants by the wearers during the process of immersion or removal of the lenses from the solutions. In addition, some of the organisms like Serratia and Pseudomonas species are resistant to some disinfecting solutions (Willcox *et al*., 2010). There is no doubt that antimicrobial performance of contact lens disinfection systems is an important factor in reducing contamination (Zanetti *et al*., 1995).

The objective of this study was to isolate the micro-

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organisms which contaminate the ophthalmic disinfecting solutions and caused microbial keratitis, conjunctivitis and vision loss.

MATERIALS AND METHODS

Ophthalmic contact lenses solutions were obtained from 25 students of Jinnah University for Women who were the regular user of contact lenes. The sample was collected in sterile tubes and stored in room temperature. The tubes were opened under aseptic conditions. 50µl from each sample solutions inoculated in tryptic soy broth for enrichment and incubated at 24hrs at 37 °C. From enrichment broth, Mannitol Salt Agar and MacConkey agar were inoculated and incubated at 37°C for 24-48 hours. Bacterial isolates were characterized by Gram's staining and following standard biochemical test such as IMViC, catalase, TSI. Antimicrobial susceptibility test was determined by Kirby-Bauer method. All strains were tested with lincomycin (L), streptomycin (S), cephalexin (CFX), oxacilin (OX), methicillin (MET), penicillin (P), cefaclor (CFC).

RESULTS AND DISCUSSION

In-use ocular solutions samples from 25 students commonly yielded gram-negative bacteria and gram positive bacteria. The age of students ranged from 22 to 25 years. Results showed that a total of 43 strains were isolated including 20 gram positive and 23 gram negative bacteria. The bacterial species were Enterobacter, Pseudomonas, Serratia, *Staphylococcus aureus*, Klebsiella, Bacillus., *E.coli*, Proteus, Salmonella, and Citrobacter and *S. epidermidis*. From contact lens solutions, *S. aureus* was the most common microorganisms found in this study. All 25 contact lens wearers (100%) were contaminated contact lenses solutions. Figure 1 showed the percentage of isolated microorganisms. It was reported previously that *P. aeruginosa* was the most common contaminant of contact lenses solutions. In our study asymptomatic subjects were analyzed during the study, which showed that *S. aureus* was the highest number of all the isolate (26%) than *Pseudomonas spp*. It has been implicated in several lens wearer complications including keratitis and corneal ulcers. The results of the present study are reflective of the observation that *P. aeruginosa* and *S. aureus* are the dominant bacteria that cause ocular infections among contact lens wearers. These finding are in confirmation with the earlier reports.

In this study, gram+ *Bacillus sp*. rate were 16%. Few cases of Bacillus keratitis among contact lens wearers were reported earlier (Pinna *et al*., 2001). Bacillus spores survived multiple lens disinfection treatments.

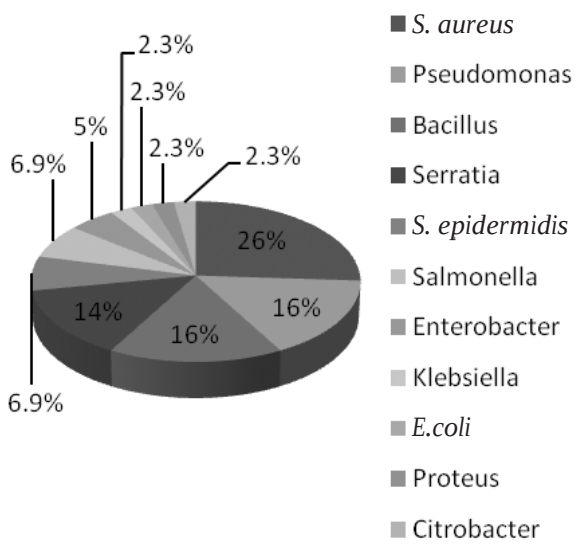

Figure 1: Distributions of bacterial strains isolated from lens solutions

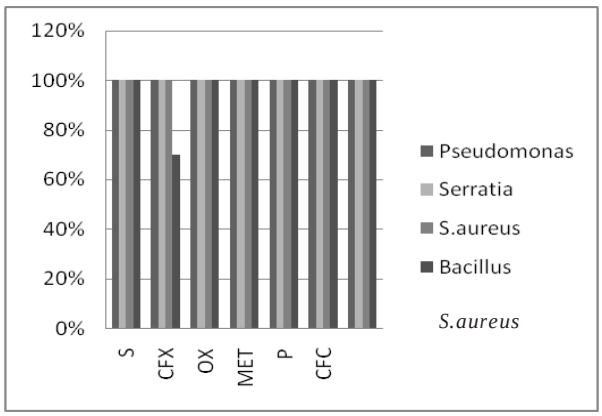

Figure 2: Resistivity pattern of isolated organisms

Key words: lincomycin (L), streptomycin (S), cephalexin (CFX), oxacilin (OX), methicillin (MET), penicillin (P), cefaclor (CFC), resistant (R), intermediate(1.6cm).

The MIC test results of Pseudomonas show that resistivity against lincomycin, streptomycin, cephalexin, oxacilin, methicillin, penicillin, and cefaclor antibiotics. Except *Bacillus spp*, showed intermediate against streptomycin, all organisms were resistant and show no inhibitions (fig.2). Aminoglycosides and fluoroquinolones (ciprofloxacin) are the choice of drugs than ß-lactams and given to those which show resistant with ß-lactams

CONCLUSION

In conclusion, our findings suggest that most contact lens disinfecting solutions may be ineffective if contact lens care systems become contaminated with micro-organisms. The most common bacteria that contaminate contact lenses and its accessories were *S. aureus* and *P. aeruginosa.* The results suggested that *P. aeruginosa* isolated from different infectious samples may have different characteristics. We found that all strains of *P. aeruginosa* were resistant to the antibiotic ß-lactam while three strains (Serratia, *S.aureus*, and Bacillus) were also resistant; except bacillus they were show intermediate to streptomycin so these antibiotics cannot be used in the treatment of infections caused by these resistant strains of *P. aeruginosa* and *S. aureus*. Contact lens disinfecting solutions with same formulation but manufactured by different companies, possess different disinfecting potential.

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