



## CONTACT LENSE KERATITIS BY SPHINGOMONAS PAUCIMOBILIS- A RISING CONCERN

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**ABSTRACT**

Microbial keratitis (MK) is a corneal condition that encompasses several different pathogens and aetiologies. While contact lens associated MK is most often associated with bacterial infections, other pathogens (fungi, Acanthamoeba species, etc) may be responsible. A rare case of contact lenses bacterial keratitis was isolated in our hospital which was caused by *Sphingomonas paucimobilis*. This case report helps in understanding ocular risk related to contact lenses wearer in evolving generation and utmost care to be taken to avoid same.

**KEYWORDS :** *Sphingomonas paucimobilis*, keratitis, contact lenses, *Pseudomonas paucimobilis*,

**INTRODUCTION**

Microbial keratitis is a potentially ocular threatening condition that occurs due to invasion of cornea by microorganisms such as bacteria, fungi and viruses. Bacterial corneal ulcers can be caused by both gram-positive and gram-negative organisms. Gram-negative organisms are usually associated with more severe and rapidly progressive corneal ulcers compared with gram-positive organisms due to their ability to produce lytic enzymes. (1)

Association between microbial keratitis and contact lens wear is undisputed (2) Several studies have reported an increased risk of infectious keratitis with the use of soft contact lenses as a cosmetic lens for myopic eye on an extended-wear basis. (3) Most articles related to contact lens-associated microbial keratitis have been documented mostly from developed countries like United States. Developing countries like Indian sub-continent have also documented soft lenses associated keratitis (4,5) the microbiologic profile of keratitis associated with the extended wear of cosmetic soft contact lenses includes a large variety of microorganisms, notably gram-negative organisms such as *Pseudomonas* spp., *Hemophilus* spp., *Moraxella* spp., and so on. (6)

Therapeutic soft contact lens wearers, conversely, develop corneal ulcers most often caused by gram-positive bacteria, especially streptococci, and uncommon organisms like acanthamoeba. Fungal keratitis is surprisingly rare in both groups, however fungal contamination of hydrogel contact lenses is now increasing in Indian population with asymptomatic contact lens wear (daily and extended wear). (7,8)

*Sphingomonas paucimobilis*, also known as *Pseudomonas paucimobilis*. It is gram negative aerobic bacillus that can cause various systemic and ocular infections. (9,10). In ocular infection it mostly causes endophthalmitis and panophthalmitis and sometimes microbial keratitis. *Sphingomonas paucimobilis* lack lipopolysaccharide A in cell wall which is reason for its low virulence. Microbial keratitis caused by this organism is rare and mostly one or two cases have been reported so far from India. (10) However, we have

reported a case of microbial keratitis in contact lenses wearer due to *Sphingomonas paucimobilis* in our hospital. Corneal scrapping and used contact lenses received in the laboratory was processed by standard microbiological methods for bacterial and fungal infections.

**Case Study**

A 20-year-old female student presented to ophthalmology OPD with complaints of sudden onset of bilateral ocular pain with eye lid oedema, redness, lacrimation and photophobia since 3 days,

She was myopic for 5 years and regular user of soft hydra gel contact lenses since last three year, contact lens were of monthly disposable type, however she did not have past history of any ocular trauma or infection, tap water exposure of eye, previous ocular surgery, use of steroids (topical or systemic) or similar episodes in the past.

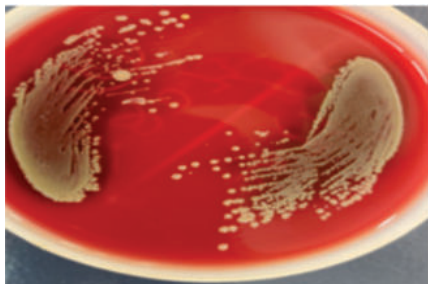
On examination, her vision was reduced, on slit-lamp examination, there was mild congestion bilaterally, the right cornea showed a central 'Y' shaped epithelial defect of 3-4mm. The left cornea showed paracentral epithelial defect of 6mm. However, anterior chamber showed no cells with few infiltrates.

Fundus examination was not possible due to intense pain. Intraocular pressure was normal by digital method. The contact lenses stored in lens solution along with bilateral tiny corneal scrapping in normal saline were sent to the Microbiology laboratory for further microbial investigation. swab was taken before starting antibiotics.

Samples received in the laboratory was taken for bacterial cultural sensitivity. First, a wet mount was prepared suggestive of no organism which ruled out protozoan infestation (M.C. Acanthamoeba and fungal). For bacterial growth, a corneal scrapping of both eyes and contact lenses were plated on Blood agar and MacConkey agar and kept for 12 hours of incubation at 37 degrees Celsius. After incubation yellow, non-haemolytic colonies were seen on blood agar and no growth on MacConkey agar (fig.1&2).



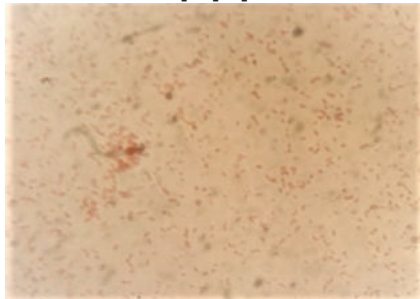
**Fig. 1** yellow non haemolytic colony of *Sphingomonas paucimobilis* on blood agar from corneal scrapping sample of patient



**Fig. 2** yellow non haemolytic colony of *Sphingomonas paucimobilis* on blood agar from contact lense sample of same patient

Both samples contact lenses as well as corneal scrapping from both eyes showed same growth. Furthermore, a gram stain smear was prepared from the growth Gram Negative Bacilli (fig .3) was appreciated on microscopy followed by motility test for which organism was found to be motile. Later GNB id and AST was performed via ViteK machine and organism was identified to be *Sphingomonas paucimobilis* with 93% confidence. Conventionally organism was found to be oxidase positive,

And shows esculin hydrolysis along with positive ONPG test. Isolate was also sensitive to polymyxin B and Vancomycin



**Fig 3** gram stain at 100x s/o gram negative bacilli

#### Treatment

The treatment was empirically initiated on the first day itself with topical Gatifloxacin 0.3% eye drops, Tobramycin eye drops 0.3%, Eye mist eyedrops. Later organism was found sensitive to ciprofloxacin and continued the same. Patient was instructed to apply eyedrops every 2 hourly along with Occupol ointment application twice a day and was advised for eye patching along with Eye mist gel at night.

Patient came for follow up after 7day with reduced symptom and slit- lamp and fundus examination showed no abnormality.

#### DISCUSSION

*Sphingomonas paucimobilis* belong to group of gram-negative lactose non fermenting bacteria that usually fail to grow on MacConkey agar, are oxidase positive, and can oxidise glucose. Other organism belonging to this group are

*Acidovorax facilis*, CDC group IIc, CDC group IIe CDC group IIh, CDC group IIIi, CDC group O-1, CDC group O-2, CDC group O-3, *Sphingobacterium mizutaii*, *Sphingobacterium multivorum*, CDC IIk-2, *Sphingomonas parapaucimobilis*. (11,12)

They are strict aerobes that produces deep yellow pigmented colony on 5% sheep blood agar. *Sphingomonas paucimobilis* are sensitive to polymyxin B which differentiate it from *Sphingobacterium*.(11,12)It has single polar flagellum which is responsible for its slow motility. It was initially known as CDC Group IIIk, biotype 1 later was named *Pseudomonas paucimobilis* and was placed under genus *Sphingomonas* (11,13).

*Sphingomonas paucimobilis* are not part of human flora but they ubiquitous in soil and water. They are mostly waterborne organism that can exist in hospital water systems patient exposed through contaminated medical devices or solutions(14).they can also be isolated from swimming pools, other water and laboratory supplies. It is associated with various human infections like peritonitis, wound infections, leg ulcer, empyema, splenic abscess, brain abscess, and can also be isolated from sample like blood cultures, and CSF, urine, vaginal, and cervical samples. (15,16). Recently, *Sphingomonas paucimobilis* usually having little clinical significance. However, community-acquired infection, diabetes mellitus, and alcoholism are some significant risk factors for organism. (16,17) A retrospective study suggests that the prevalence of *Sphingomonas paucimobilis* infection in humans seems to have increased in recent times, and although it has low virulence, infection can lead to septic condition in immunocompromised patients. It can also cause complications in hospitalized patients. (18,19)

one of the study says that *Sphingomonas* is present in the shower curtain biofilms. The study stated that the "soap scum" of shower curtains is in fact hub for micorbes, hence study state that shower curtains can be threaten to immune-compromised or ill patients, and that consistent exposure to source of infection such as shower curtains can lead to health problems. (20)

*Sphingomonas* have ability to utilize a wide range of organic compounds for their survive under low-nutrient conditions. Although many strains of *Sphingomonas* have been isolated from relatively clean environments, a great portion of them also had been discovered in contaminated locations which included toxic compounds such as PCBs, creosote, pentachlorophenol, herbicides, etc. In one study by Nishiyama *et al*, a strain of *S. paucimobilis* that degrades hexachlorocyclohexane survived and grew in contaminated soil, especially inside of soil aggregates less than 0.025 mm in diameter, despite its surviving poorly in an unamended control soil. Also, the bacterium maintained higher population densities in the presence of the contaminant than in its absence.(21) These discoveries demonstrate that *Sphingomonas* can utilize contaminants as a growth and energy source and that it can compete successfully with the indigenous organisms in various environments.

till now No definitive guidelines has been issued for sphingomonas prevention and cure however these organism are potentially active against trimethoprim-sulfamethoxazole, chloramphenicol, ciprofloxacin, and aminoglycoside, and are resistance to beta-lactams but no validated susceptibility testing methods exist.(11,22,23)

#### CONCLUSION

Ocular keratitis is a growing concern especially in the lens wearers , hence universal sanitary precautions should be practiced. Adequate lens care should be practiced. Usage of tap water instead of lens solution should be avoided. Hand

washing before lens application should be encouraged.  
Uncommon environmental pathogens are of rising concern.

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