

# Ocular microbial flora in Contact lens and non-contact lens wearers – Are they symptomatic?



Rajeswari Mahadevan, Geetha K, Malathi J

1.Medical Research Foundation, Sankara Nethralaya, 2.Vidhyasagar Institute of Biomedical Technology and Science, Sankara Nethralaya, 3. Elite School of Optometry, 4.Birla Institute of Technology and Science, Pilani

## BACKGROUND

- CL contamination by *Pseudomonas* species (2014) 30% of monthly disposables, 4% of daily disposables,
- 7% cosmetic contact lens, 43% of biweekly modalities-Hong Kong
- Bacterial binding due to improper maintenance lead to ocular infection EW and DW (1997)
- CNS, *Streptococcus*, *Propioni bacterium*-Australian eyes,
- Fungi and Bacilli species - Indian eyes
- Dilemma-Practitioners for the treatment in complications like contact lens discomfort, contact lens related inflammation and infection.
- Dilemma in differentiating an early infection or inflammation as both presents with similar signs and symptoms
- The environmental difference exists between the two populations. Bacterial flora in the Indian population is very limited

## AIM

- To assess microbial profile in contact lens and non contact lens wearers in Indian population

### Objectives:

- Assess conjunctival flora in contact lens and non contact lens wearers
- Assess microbial contamination in contact lens and lens case
- Correlate the microbial culture report with clinical presentation in symptomatic and asymptomatic contact lens wearers

### Criteria for case (CL wearers)

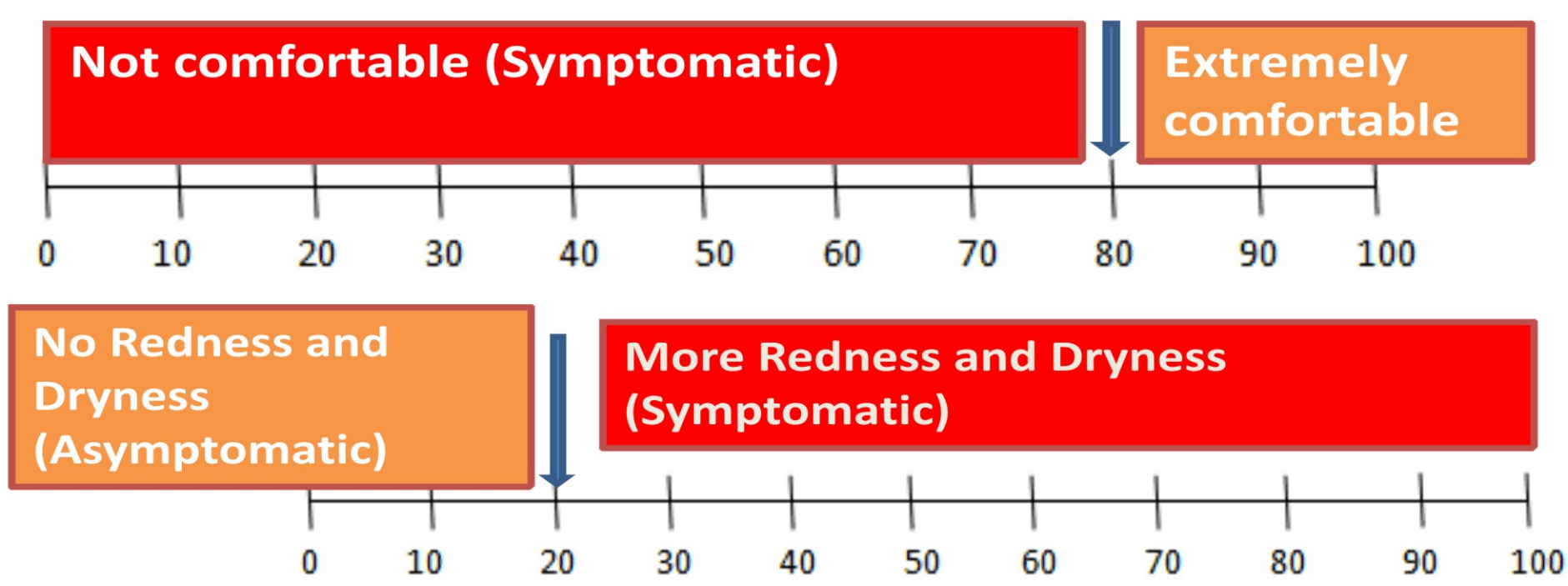
Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"><li>Age 18-40 years</li><li>CL group:Monthly disposable SCL wearers for both eyes</li><li>Atleast 1 year of CL wear experience 18,19</li><li>Non cl wearer for NCL group</li><li>Willing for conjunctival swab, hand over CL and lens case</li></ul>	<ul style="list-style-type: none"><li>Vision &lt;6/9</li><li>Current CL less than 15 days old</li><li>History of ocular pathology/surgery</li><li>Systemic illness/pregnancy/lactating women</li><li>Use of Antibiotic drops within 3 months</li><li>Any use of systemic medication</li><li>Ocular surface disorder (Dry eye/Steven Johnson syndrome)</li><li>Clinical sign EFRON grade greater than grade 2</li></ul>

## METHODS

- Study design: Descriptive comparative study
- Type of sampling: Convenient sampling
- Study duration: One year (May 2016-April 2017)
- Study population: Patients who are visiting to CL clinic and volunteers
- Sample size: 24 CL wearers and 24 non CL wearers

### Comfort score

- Vision
- Overall comfort



### Demographics

Demographics	CL wearers (n=24 eyes)	Non-CL wearers (n=24 eyes)	p value
Age in years (Median, IQR)	25 (22-26)	23 (21-25)	0.25*
Gender (M:F)	5:19	7:17	0.74#
No of eyes with positive organisms in any sample(conjunctival Swab/CL/lens case)	21/24	24-Feb	-

### List Of Microorganisms Isolated From Difference Samples

Samples	Commensal bacteria 10 (Non Pathogenic)	Pathogenic organisms (Opportunistic) 10
Conjunctival swab (CL and Non CL wearers)	<i>Staphylococcus epidermidis</i>	-
CL	<i>Staphylococcus epidermidis</i> Bacilli species Viridans <i>Streptococci</i>	<i>Pseudomonas aeruginosa</i> <i>Staphylococcus epidermidis</i> (Methicillin resistant) <i>Escherichia coli</i> <i>Sphingomonas paucimobilis</i> <i>Pseudomonas stutzeri</i> <i>Acinetobacter</i> species
Contact lens case	<i>Staphylococcus epidermidis</i> <i>Staphylococcus saprophyticus</i>	<i>Pseudomonas aeruginosa</i> <i>Chromobacterium violaceum</i> <i>Sphingomonas paucimobilis</i> <i>Enterobacter aerogenes</i> <i>Acinetobacter</i> species <i>Candida albicans</i>

### Correlation of Positive growth in CL and lens case with other factors

CL usage Spearman Correlation	Positive growth of organisms	“r”value	p value*
Age of subjects	Growth in CL	-0.33	0.87
	Growth in Lens case	-0.3	0.88
	Compliance	-0.25	0.23
Years of lens wear	Growth in CL	0.11	0.95
	Growth in Lens case	0.01	0.94
	Compliance	1.44	0.5
Wearing hours of CL	Growth in CL	0.44	0.02
	Growth in Lens case	-0.26	0.21
Age of CL	Growth in CL	-0.51	0.01
	Growth in Lens case	-0.26	0.21

•More the wearing hours found to have positive growth of organisms

•Lesser days of CL found to have positive growth of organisms

### Growth of organisms in CL and lens case with compliance

Lens accessories (n=24)	p Value*
CL and Lens case	1
Compliance and growth in CL	0.6
Compliance and growth in lens case	1

### Clinical findings between CL and non CL WEARERS

Anterior segment grading-Efron scale (0-5)	CL wearers (Median, IQR*) n=24 eyes	Non CL wearers (Median, IQR*) n=24 eyes	p value*
Conjunctival redness	0	0	0.53
Limbal redness	0	0	0.15
Corneal neovascularization	0	0	0.31
Corneal staining	0	0	0.31
Conjunctival staining	0	0	1
Papillary reaction	1 (0-1.50)	0 (0-1)	0.19
Blepharitis	0	0	1
Meibomitis	1 (0.5-2.00)	0.5 (0-1)	0.004

One subject from CL wearing group found to have positive growth of organism “*Staphylococcus epidermidis*” with a positive clinical sign of grade 2 Papillary roughness and grade 1 Conjunctival redness

### Clinical presentation in between symptomatic and asymptomatic CL wearers

Characteristics	Symptomatic group (Median, IQR) n=7	Asymptomatic group (Median, IQR) n=17	p value*
Years of lens wear(yrs)	6 (3-8)	2.5 (2-6)	0.34
Wearing time(hrs)	12 (11-13)	12 (10-12)	0.44
Current CL usage(days)	30 (30-30)	25 (18-30)	0.1
Current case usage(days)	30 (16-38)	45(30-60)	0.06
Type of CL wear (HY:SIHY)	2:05	9:8	0.37#
Subjective symptoms			
Vision	80(80-98)	95(90-100)	0.16
Comfort	85(80-90)	90(80-98)	0.29
Dryness	40(33-50)	10(3-20)	0.0002
Redness	10 (0-35)	0(0-10)	0.15
Clinical signs (EFRON grade scale)			
Papillary roughness	2 (1-2)	1(0-1)	0.008
Meibomitis	2(1.5-2)	1(0-1)	0.02

- Symptomatic CL wearers presented with more clinical signs compared with asymptomatic CL wearers
- Both groups isolated with pathogenic and non pathogenic organisms

## DISCUSSION

### Factors Influeincing Growth Of Organisms In Cl Or Lens Case

- Positive clinical signs were observed in all 7 symptomatic subjects among which 5 subjects were isolated with pathogenic organisms
- Papillary reaction, meibomitis and dryness were slightly more in symptomatic DW CL users.
  - Mechanical and environmental influences are predisposing factor for an increase in lid roughness and dehydration of CL
  - Solution toxicity, environment, discomfort or bacterial lens contamination were reported to have 4-8 fold increase in risk for developing corneal inflammatory events such as CLPC [Tagliaferr et al, 2014 and Szczotka, 2010]
- In the present study the the comfort with lenses containing pathogenic organisms were not affected by the years of CL wear.
  - This suggests that the comfort level is not affected by pathogenic organisms as they become adapted lens wearers over a period of years of lens wear lens wear.

### Clinical Signs And Symptoms

- Positive clinical signs were observed in all 7 symptomatic subjects among which 5 subjects were isolated with pathogenic organisms
- Papillary reaction, meibomitis and dryness were slightly more in symptomatic DW CL users.
  - Mechanical and environmental influences are predisposing factor for an increase in lid roughness and dehydration of CL
  - Solution toxicity, environment, discomfort or bacterial lens contamination were reported to have 4-8 fold increase in risk for developing corneal inflammatory events such as CLPC [Tagliaferr et al, 2014 and Szczotka, 2010]
- In the present study the the comfort with lenses containing pathogenic organisms were not affected by the years of CL wear.
  - This suggests that the comfort level is not affected by pathogenic organisms as they become adapted lens wearers over a period of years of lens wear lens wear.

## LIMITATIONS

- Subjects with different complications, beyond grade 2 findings were not compared
- Limited sample size
  - Though this is a pilot study, it required consent from subject willing for conjunctival swab, hand over CL and lens case for microbial assessment which needed detailed counseling
- Different types of CL solution usage were not assessed with lens case
- Types of CL materials with equal samples were not compared

## CONCLUSION

- Pseudomonas species*** were identified in both symptomatic as well as asymptomatic CL wearers.
- Most of the subjects with pathogenic organisms were symptomatic with positive clinical signs
- Hence it is worth while to perform microbial assessment in symptomatic eyes or in eyes with positive clinical signs

## REFERENCES

- Lai, T. H., Jhanji, V., & Young, A. L. (2014). Microbial Keratitis Profile at a University Hospital in Hong Kong. International Scholarly Research Notices, 2014.
- Young, G., Riley, C. M., Chalmers, R. L., & Hunt, C. (2007). Hydrogel lens comfort in challenging environments and the effect of refitting with silicone hydrogel lenses. Optometry & Vision Science, 84(4), 302-308.
- Sankaridurg, P. R., Sharma, S., Willcox, M., Naduvilath, T. J., Sweeney, D. F., Holden, B. A., & Rao, G. N. (2000). Bacterial colonization of disposable soft contact lenses is greater during corneal infiltrative events than during asymptomatic extended lens wear. Journal of clinical microbiology, 38(12), 4420-4424.
- Cope, J. R., Collier, S. A., Rao, M. M., Chalmers, R., Mitchell, G. L., Richdale, K., ... & Zimmerman, A. (2015). Contact lens wearer demographics and risk behaviors for contact lens-related eye infections—United States, 2014. MMWR Morb Mortal WklyRep, 64(32), 865-70.
- Lakkis, C., Anastasopoulos, F., Terry, C., & Borazjani, R. (2009). Time course of the development of contact lens case and contact lens contamination. Investigative Ophthalmology & Visual Science, 50(13), 6352-6352.
- Devonshire, P., Munro, F. A., Abernethy, C., & Clark, B. J. (1993). Microbial contamination of contact lens cases in the west of Scotland. British Journal of Ophthalmology, 77(1), 41-45.
- Panthi, S., Paudel, P., Chaudhary, M., Sapkota, K., & Shah, D. N. (2014). Microbial contamination of contact lens care accessories and compliance with care regimens in Nepal. Contact Lens and Anterior Eye, 37(1), 2-10.
- Willcox, M. D., Power, K. N., Stapleton, F., Leitch, C., Harmis, N., & Sweeney, D. F. (1997). Potential sources of bacteria that are isolated from contact lenses during wear. Optometry & Vision Science, 74(12), 1030-1038.
- Wu, Y. T., Willcox, M. D., & Stapleton, F. (2015). The effect of contact lens hygiene behavior on lens case contamination. Optometry & Vision Science, 92(2), 167-174.
- Szczotka-Flynn L, Lass JH, Sethi A, Debanne S, Benetz BA, Albright M, Gillespie B, Kuo J, Jacobs MR, Rimm A. Risk factors for corneal infiltrative events during continuous wear of silicone hydrogel contact lenses. Invest Ophthalmol Vis Sci. 2010.
- Tagliaferri, A., Love, T. E., & Szczotka-Flynn, L. (2014). Risk Factors for Contact Lens Induced Papillary Conjunctivitis Associated with Silicone Hydrogel Contact Lens Wear. Eye & contact lens, 40(3), 117.