

## Contact lens use and its compliance for care among healthcare workers in Pakistan

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**Background:** Poor care and hygiene of contact lens (CL) results in eye problems and infections. Healthcare workers have an important role in advocating correct lens care. **Objectives:** To determine the practices of CL care and the adverse consequences of poor CL care among healthcare workers. **Setting and Design:** A cross-sectional study in one public and three private sector hospitals in Karachi, Pakistan, in 2009–2010. **Materials and Methods:** We questioned 500 healthcare workers of all ages and both sexes, who wore CL, about compliance with advice on care and any complications due to improper hygiene practices. Ethical approval was obtained. Chi-square tests were used to determine significance and *p-value* less than 0.05 was considered statistically significant. **Results:** Of the total CL users, 385 (77%) were females. Most (75%) respondents wore CL to correct myopia, whereas 54% wore CL only occasionally. Surprisingly, only 24% knew the CL cleaning protocol. Lens solution was changed daily by 33% of users and after more than 2 weeks by 42%. Although 412 (82%) participants practised reasonable hand hygiene before inserting CL, 88 (18%) did not. Infection and eye dryness were statistically significantly ( $P < 0.01$ ) associated with sex, hand-washing, and frequency of CL use. **Conclusion:** Noncompliance with the CL protocol was common among healthcare workers in our society. This behavior calls for targeted health education and awareness programs for healthcare workers.

**Key words:** Contact lens, healthcare workers, health professionals

Contact lens (CL) offers many advantages over eyeglasses, in addition to correcting refractive errors. A growing body of research shows that CL is safe and convenient, even for children and adolescents.<sup>[1-6]</sup> Nevertheless, complications have been associated with CL wear, ranging from conjunctivitis and dryness symptoms to microbial keratitis, which in rare instances lead to loss of vision.<sup>[7-9]</sup>

Usually, such complications tend not to be severe, as they are often attributable to poor CL care and hygiene. One in three eye problems suffered by lens users is a direct result of improper lens care and cleaning.<sup>[10,11]</sup> A recent survey showed significant noncompliance with lens care, case hygiene, and lens case replacement procedures.<sup>[11]</sup> Furthermore, prolonged wear and overnight use of CL increases the risk of infection.<sup>[12]</sup>

Healthcare professionals are role models for their patients. They are the immediate source of recommendation for CL to patients and have a key role in advocating correct practices for the use and care of CL.<sup>[10,13]</sup> Although a few studies have documented contamination of CL in Pakistan,<sup>[14,15]</sup> a literature review showed that the practices of health professionals wearing CL and their compliance with CL care have not been studied. Eye health professionals are in an obvious position to communicate better understanding of the value of vision care and vision wear, provided they themselves are well informed. The objective of this study was to determine the practices of

CL care and to document the adverse consequences of poor CL use among health professionals in Pakistan.

### Materials and Methods

A cross-sectional study was conducted between October 2009 and April 2010. A total of 1620 healthcare workers in one public and three private sector hospitals in Karachi were approached. According to the World Health Organization, a healthcare worker is anyone whose focus or activity is to improve health, including doctors, dentists, nurses, and midwives, as well as technicians and managers.<sup>[16,17]</sup> Those who wore CL were asked to participate in the study. The order of priority was doctors, dentists, and then paramedical staff; individuals with other occupations in the hospital setting and those wearing rigid CL were excluded. With an estimated prevalence of 50%, a 95% level of confidence, and an absolute precision of 0.05, a sample size of 385 was calculated. Nonetheless, 500 CL users filled in a self-administered questionnaire.

The questionnaire [Appendix 1] was developed on the basis of the Contact Lens Care Guidelines<sup>[18]</sup> of the American Academy of Ophthalmology [Box 1]. It included questions on compliance with recommendations for CL care and complications due to improper hygiene practices and also elicited data on the sex, age, and occupation of the respondents. Additional hand-washing with soap before opening the lens case, changing the lens solution daily, rubbing the CL with fingers, and rinsing the lenses with solution before soaking were taken as strong adherence to the CL protocol, whereas omission of any of these acts was considered as poor adherence to the protocol. Eye infections were graded as mild, moderate, or severe. An infection lasting 2–3 days was considered mild, one lasting 1–2 weeks was considered moderate, and one lasting for more than 2 weeks was considered severe. Mild and moderate cases were included in the broader category of

#### Access this article online

##### Website:

www.ijo.in

##### DOI:

10.4103/0301-4738.97552

#### Quick Response Code:



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Manuscript received: 01.06.11; Revision accepted: 21.10.11

“contact lens-induced red eye,” while corneal abscess formation and anterior chamber inflammation were considered severe infections. The participants were asked to recall the infection caused by using CL, and those with severe infections were asked to identify the organism (if any) found on culture.

**Box 1: Contact Lens Care Guidelines**

- Before handling contact lenses, wash your hands with soap and water, then rinse and dry them with a lint-free towel.
- Minimize contact with water, including removing lenses before going swimming or in a hot tub.
- Contact lenses should not be rinsed with or stored in water (tap or sterile water).
- During cleaning, rub your contact lenses with your fingers, then rinse the lenses with solution before soaking them. This “rub and rinse” method is considered by some experts to be a superior method of cleaning, even if the solution you are using is a “no-rub” variety.
- Rinse the contact lens case with fresh solution — not water. Then leave the empty case open to air dry.
- Keep the contact lens case clean and replace it regularly, at least every three months. Lens cases can be a source of contamination and infection. Do not use cracked or damaged lens cases.
- Handle your contact lens solution with care.
- Do not re-use old solution or “top off” the solution in your lens case.
- Do not transfer contact lens solution into smaller travel-size containers. This can affect the sterility of the solution, which can lead to an eye infection.
- Do not allow the tip of the solution bottle to come in contact with any surface, and keep the bottle tightly closed when not in use.

**Table 1: Reason for use of contact lenses, frequency of use, frequency of changing lens solution and hand-washing practices among 500 health professionals**

	Frequency	%
Reason for wearing contact lens		
Myopia	374	74.8
Hyperopia	5	1.0
For aesthetic or cosmetic purpose	121	24.2
Contact lens use		
Daily	103	20.6
Weekly	128	25.6
Occasionally	269	53.8
Frequency of change of lens solution		
Daily	167	33.4
Alternate days	54	10.8
Weekly	68	13.6
More than weekly	211	42.2
Rinse contact lens case		
Yes	156	31.2
No	344	68.8
Hand-washing before contact lens use		
Yes	233	46.6
Additional washing after lens case opening	179	35.8
No	88	17.6

Eligibility criteria included all healthcare personnel irrespective of age and sex, while individuals with other occupations in the hospital setting and those wearing rigid CL were excluded from the study.

The aim, objectives, and rationale of the study were verbally explained to the participants in a plain language statement, and filling in the questionnaire was taken as consent to participate in the study. The participants were allowed to withdraw at any time during filling in the questionnaire. The research protocol was approved by the Ethics Review Board of the university to which the researchers belong.

The data variables of completely filled questionnaires were entered into SPSS version 18.0 software. Frequencies of reported variables were reported as percentages, and chi-square test was used to analyze categorical variables where appropriate; *p-value* < 0.05 was taken as statistically significant.

**Results**

Women represented the majority of the 500 respondents (385, 77%), with 115 (23%) male participants. The participants consisted of 340 (68%) doctors, 113 (22%) dentists, and 47 (9.4%) paramedical staff. Most (75%) of the participants wore CL to correct myopia, while 25% used them for aesthetic or cosmetic purposes; 54% wore CL only occasionally. Surprisingly, only 24% of the respondents were aware of the CL cleaning protocol.

Regarding CL practices, 167 (33%) respondents changed the lens solution daily, while 211 (42%) changed it after more than 1 week. Only 31.2% of the participants rinsed the contact lens case. Although 412 (82%) practised reasonable hand hygiene before inserting their CL, this was not observed by 88 (18%) respondents [Table 1].

Half of the respondents complained of varying degrees of eye infection after recurrent use of CL [Table 2]. Of the 36 respondents with severe infection, 17 reported a positive culture of *Acanthamoeba*, while the rest recorded no growth in culture. Of those with less severe conditions, 210 (42%) had eye dryness after CL use. When infections and dryness were cross-tabulated with sex, hand-washing practices, and frequency of CL use, all the variables were found to be statistically significant (*P* < 0.01). Surprisingly, the odds ratio for infection after hand-washing was 2.26 (95% CI: 1.54–3.32) [Table 3].

**Discussion**

An unexpected result of this study was the lack of awareness

**Table 2: Eye complaints due to use of contact lens among 500 health professionals**

Complaint	Frequency	%
Infection		
Mild	173	34.6
Moderate	43	9.4
Severe	36	7.2
None	248	49.6
Dryness of eye		
Yes	210	42.0
No	290	58.0

**Table 3: Eye complaints according to sex and contact lens care practices among 500 health professionals**

	Infection*			Dryness		
	Yes n (%)	No n (%)	P-value	Yes n (%)	No n (%)	P-value
Sex						
Male	115 (45.6)	0 (0)	<0.01	100 (47.6)	15 (5.2)	<0.01
Female	137 (54.4)	248 (100)		110 (52.4)	275 (94.8)	
Hand-washing**						
Yes	174 (69)	123 (49.6)	<0.01†	210 (100.0)	202 (69.6)	<0.01
No	78 (31.0)	125 (50.4)		0 (0)	88 (30.3)	
Contact lens use						
Daily	67 (26.5)	36 (14.5)	<0.01	50 (23.8)	53 (18.3)	<0.01
Weekly	82 (32.5)	46 (18.5)		90 (42.9)	38 (13.1)	
On occasions	103 (40.9)	166 (66.9)		70 (33.3)	199 (68.6)	

†OR = 2.26 (95% CI: 1.54–2.26), \*Mild, moderate, and severe infection combined for the purposes of statistical analysis, \*\*"Yes" and "additional" combined for the purposes of statistical analysis

of most healthcare providers about standard CL care, which is even more remarkable as all the participants were CL users. Although no guidelines for CL care have been published in Pakistan, guidelines have been published for the general public in Australia<sup>[10]</sup> and the USA<sup>[13,18,19]</sup> and specifically for general practitioners in the United Kingdom.<sup>[9]</sup> Knowledge about CL care and hygiene for healthcare personnel is needed in developing countries, including Pakistan. Nevertheless, a study in Australia reported inconsistent, inadequate recommendations for CL hygiene by various advisory bodies, including optometrists.<sup>[20]</sup>

One of the well-established risk factors for CL-related complications is poor hand hygiene, the presence of which has been reported to be between 11% and 50%.<sup>[7,21]</sup> In the present study, however, participants who did not wash their hands had a significantly lower odds ratio for having eye infection than those who washed their hands. Hand-washing might have been ineffective because of (a) use of a wrong technique for hand-washing; (b) use of polluted water, especially in the light of the positive cultures of *Acanthamoeba*, a ubiquitous organism; (c) changing the lens solution only at an interval of more than 1 week; or (d) poor CL case hygiene. Although these healthcare providers took the specific precautionary step of hand-washing, they should also stress other measures of CL care and transmit such practices to CL users in their clinical practice.

Dryness of eyes is a common complication of CL use. Slightly less than half the respondents in the present study complained of eye dryness, which was statistically significant ( $P < 0.01$ ) for men. In contrast, Chalmers and Begley (2006) analyzed dryness symptoms among patients with and without CL and found dryness in a higher proportion of women. Although a similar proportion of dryness was also found among male users in another study,<sup>[8]</sup> the occasional use of CL only for cosmetic reasons by women in our study might explain this gender trend. A recent French study reported a highly increased relative risk for infections among cosmetic CL wearers.<sup>[22]</sup> As more than half the respondents in the present study wore CL only occasionally, they probably did not change their solution daily, and it is unlikely that they replaced their disinfecting solution

## Appendix 1

### Questionnaire

**Instructions: Please attempt all questions. Mark a tick  or fill in the blanks as appropriate**

- Q1. Sex:** 1) Male  2) Female   
**Q2. Age:** \_\_\_\_\_ (in years)  
**Q3. Occupation:** 1) Doctor  2) Dentist  3) Paramedical staff   
**Q4. Any refractive error:** 1) Myopia  2) Hyperopia  3) None   
**Q5. What do you prefer:** 1) Contact lens  2) Spectacles / Glasses   
**Q6. Do you wear contact lens:** 1) Daily  2) Weekly  3) Only to parties or other events (cosmetically)  4) No, I am happy with my glasses   
**Q7. What precautions you take before putting in your lens?** 1) Hand wash only with soap  2) Hand wash + second hand wash with soap after opening your lens case  3) No hand washing   
**Q8. Do you rub your contact lens with fingers before soaking them in the solution?** 1) Yes  2) No   
**Q9. Do you rinse your contact lens case?** 1) Yes  2) No   
**Q10. How frequently do you change your contact lens solution?** 1) Daily  2) Alternate days  3) Weekly  4) After more than 1 week   
**Q11. Have you ever had an eye infection related to contact lens?** 1) Yes  2) No   
**Q12. If yes, then was it:** 1) Mild (2–3 days)  2) Moderate (1–2 weeks)  3) Severe (more than 2 weeks)   
**Q13. In case of severe infection, any organism found on culture?** 1) *Acanthamoeba*  2) *Pseudomonas*  3) No growth   
**Q14. Have you ever noticed that your eyes get dry after using contact lenses?** 1) Yes  2) No   
**Q15. Are you aware of the contact lens cleaning guidelines of the American Academy of Ophthalmology?** 1) Yes  2) No   
**Thank you for your participation.**

at least 6 h before using the CL. These results support those of the previously mentioned study.

Regardless of sustained hand-washing by most participants in the present study, a delay in changing the CL solution might have contributed significantly to the development of infections, including microbial keratitis. Another survey showed that

although nearly two-thirds of medical practitioners advised their patients to clean the CL cases after each use, only half the patients actually did so.<sup>[19]</sup>

The target population of this study was a specific group of professionals, and the results cannot be generalized. A larger study would be required to determine the knowledge and practices of the general population regarding CL care.

## Conclusion

Noncompliance with CL care practices was found among healthcare professionals in our study, for whom promoting correct CL care should be a priority. The behavior might be due partly to a lack of emphasis on lens care hygiene during their training. Targeted health education and awareness programs, especially for young people, could go a long way to improving compliance with CL care and preventing CL-related complications.

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**Cite this article as:** Khan MH, Mubeen SM, Chaudhry TA, Khan SA. Contact lens use and its compliance for care among healthcare workers in Pakistan. *Indian J Ophthalmol* 2013;61:334-7.

**Source of Support:** Nil. **Conflict of Interest:** None declared.