Compliance with contact lens care and factors driving noncompliance in health-care students in Jeddah, Saudi Arabia

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Abstract:

PURPOSE: This study aimed to assess compliance to contact lens care behaviors and determine common factors influencing noncompliance among a population of university students in Jeddah, Saudi Arabia.

METHODS: This is an observational, cross-sectional study in which a previously validated self-administered questionnaire consisting of 12 questions addressing compliance to contact lens wear and care was E-mailed through the university message center.

RESULTS: A total of 388 participants completed the questionnaire. Of those who completed the survey, 150 were contact lens users with an experience of 1 month or more. The average compliance rate to contact lens care was around 66%. High levels of compliance were reported in sharing contact lenses, sleeping with contact lenses, showering/swimming with contact lenses, and using water to clean contact lenses. Moderate levels of compliance were shown in overuse of contact lenses, adherence to instructions of lens cleaning, cleaning the lens case, and adherence to aftercare visits. The lowest levels of compliance were noted in washing hands before lens use and lens case replacement. Gender, smoking, contact lens experience, type and modality of contact lens usage, and contact lens purchase site were found to have a significant association with behaviors showing poor compliance. Believing there is no harm in wearing lenses for longer than the recommended replacement schedule was the primary reason given for overusing contact lenses.

CONCLUSION: Moderate levels of compliance were generally reported by respondents, necessitating the need for better strategies to reinforce the importance of compliance to contact lens care in the Saudi population.

Keywords: Compliance, contact lens, keratitis, Saudi Arabia, university

INTRODUCTION

Contact lenses have become increasingly popular among adolescents in Saudi Arabia for both refractive correction and cosmetic purposes.[1,2] Thus, contact lens-related complications continue to rise with the increased usage.[3] Contact lens-related problems range from minor discomfort to severe sight-threatening eye infections.[4,5] For instance, contact lens misuse was found to be the most significant risk factor for microbial keratitis, a serious corneal infectious disease that results in approximately 1 million clinic and emergency department visits annually, with an estimated cost of $175 million in the United States.[6,9] The etiology of microbial keratitis follows a global distribution pattern reflecting variations in population demographic and environmental factors, as well as contact lens wear. Regions with the highest prevalence of contact lens use reported a predominance of bacterial keratitis.[10] Among isolated bacterial organisms, Pseudomonas aeruginosa has always been associated with contact lens wear. Keratitis induced by such virulent organisms is rapidly developing and may cause blindness in the absence of timely management.[6,11] In a study conducted in Southern Saudi Arabia, P. aeruginosa accounted for 19.5% of contact lens-induced keratitis cases with patients requiring a mean follow-up period of 3–4 months.[12] Patient noncompliance to instructions given by eye care practitioners...
proves to be strongly associated with contact lens-related adverse events. Unhealthy habits for contact lens care include failure to wash hands, overnight wear, water exposure, solution misuse, and infrequent lens case replacement, as provided by the American Academy of Ophthalmology and the Centers for Disease Control and Prevention. Calculating the true rate of compliance to recommendations remains a challenge as long as there exists no established testing method with predefined scoring criteria. A few studies, however, attempted to assess compliance using self-reported questionnaires. A review by Claydon and Efron reported 40%–91% of contact lens users as noncompliant. A more recent study across Europe found compliance rates of 0.3% and 2.7% in daily and extended lens wearers, respectively. Factors likely contributing to the patient level of compliance include those related to the regimen cost, complexity, and convenience. Furthermore, the method of instruction and patient–clinician relation may play a role in compliance. Locally, a few studies in Saudi Arabia have been conducted to identify the habits of using contact lenses. Among them was a cross-sectional study performed in King Abdulaziz University (KAU), Jeddah, which reported that 30.4% of 536 medical students had at least one contact lens-related complication. Similarly, a study that recruited patients attending ophthalmology clinics at KAU Hospital, Jeddah, as well as visitors of a large shopping mall in Jeddah reported a high percentage of noncompliance with contact lens-related hygiene rules (89%) and a higher prevalence of associated eye complaints (93%). Another study was conducted in a mall in Riyadh on 510 contact lens wearers which demonstrated that two-thirds of participants suffered from complications requiring the assistance of eye care professionals, which suggests poor compliance to hygienic contact lens care.

To our knowledge, a very limited number of studies assessing patient compliance were conducted in Saudi Arabia and no studies reported factors influencing noncompliance. Awareness of modifiable parameters could aid in reducing contact lens-related adverse events. Furthermore, adjustments to the current practitioner instructions method are integral for improved patient compliance and, eventually, satisfaction. This study aimed to assess compliance to contact lens wear instructions among a population of university students in Saudi Arabia. The study also evaluated the factors driving noncompliant behaviors.

**Methods**

**Study design**

The study had a descriptive cross-sectional design. It was conducted among health-care students of King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia, between September and December 2020. Study subjects were invited to voluntarily participate in the study by completing a questionnaire sent via E-mail through the university message center. Contact lens wearers who have worn lenses for at least 1 month were included in the study. Participants who did not wear contact lenses or have worn lenses for <1 month were excluded.

**The questionnaire**

Permission was obtained for the use of a previously validated questionnaire by Bakkar and Alzghoul addressing compliance to contact lens wear and care. Participants were invited to fill a structured, self-administered survey inquiring about demographics and characteristics of contact lens use. The next 12 questions assessed compliant behaviors encompassing contact lens usage habits, lens case and solution replacement, general hygiene measures, and adherence to aftercare visits [Table 1]. In these particular questions, compliance level was evaluated by scores given for each response on a scale ranging from 1 to 4, with lower scores indicating better compliance levels. In accordance with previous studies, scores of 1 and 2 were considered as compliant while 3 and 4 were considered noncompliant. The questionnaire included an additional question for respondents who seldom replace lenses asking them to rank a set of common reasons for wearing lenses longer than the recommended replacement schedule from most likely to least likely.

**Sample size**

Using data reported from previous studies, the rate of noncompliance with hygienic rules among contact lens wearers in Saudi Arabia was 89%. Assuming a type I error of 5% and a precision/absolute error of 5%, the estimated sample size was 151. Sample size calculation for cross-sectional studies formula was used to calculate the sample size. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3775042/.

**Ethical considerations**

Approval from the Institutional Review Board Ethical Committee at King Abdullah International Medical Research Center was obtained before the commencement of data collection. Study subjects were required to sign informed consent forms prior to completing the survey. The study was carried out in accordance with the codes of ethics outlined by the Declaration of Helsinki.

**Statistical analysis**

All parameters gathered were coded into Microsoft Office Excel and then transferred to the Statistical Package for the Social Sciences software version 20 (International Business Machines Corp. IBM, Armonk, NY, USA) for statistical analysis. Quantitative variables such as age were presented in means and standard deviations. Qualitative variables were summarized using appropriate descriptive statistics such as frequencies and percentages. To compare categorical variables, the Chi-square test was used to evaluate the significance. A statistical significance cutoff of $P < 0.05$ was used.

**Results**

A total of 388 participants completed the questionnaire sent via E-mail through the message center of King Saud Bin Abdulaziz University for Health Sciences in Jeddah. Only 173 (44.6%)
With respect to the contact lens users’ profile, 87 (58%) participants did not know the type of lenses used whereas 53 (35.3%) individuals have used lenses for cosmetic purposes. The modality of contact lenses worn was extended (3–6 months) in 55 (36.7%) participants, daily disposable in 37 (24.7%), monthly in 35 (23.3%), and yearly replaceable in 23 (15.3%). Moreover, contact lens solutions used were multiple in 71 (47.3%) participants and not known in 64 (42.7%). With regard to the purchase site, 78 (52%) participants purchased their lenses at optic stores, comprising more than half of the sample. Furthermore, contact lens wearing time per day was 5–7 h in 75 (50%) responders. Table 3 shows the study population contact lens wear profile.

Behaviors related to lens care and the level of compliance toward each behavior are shown in Table 4. Compliance to contact lens care varied greatly with different practices. For instance, 135 (90%) participants reported rarely sharing contact lenses with others; however, 95 (63.3%) participants reported rarely washing their hands before lens use. The frequencies of compliant behaviors versus noncompliant behaviors are shown in Table 5 by combining frequencies of scores 1 and 2 for compliance and frequencies of scores 3 and 4 for noncompliance. The compliance rate ranged from 16% to 98% with an estimated average of 66%. Based on a previously published study by Morgan (2007), the level of compliance was further categorized into high level if the compliance rate was more than 80% in a certain behavior, moderate level if the compliance rate was 40%–80%, and low level if it was <40%.[18] Accordingly, high levels of compliance were reported in aspects including sharing contact lenses with others (98%), sleeping/napping with contact lenses (95.3%), using lens solution after its expiry date (86.7%), using water/saliva to clean contact lenses (85.3%), and showering/swimming with contact lenses (82.7%). Moderate levels of compliance were shown in behaviors such as adherence to aftercare visits (79.3%), keeping the old solution in lens case (topping up) (70.7%), overuse of contact lenses (64%), adherence to instructions of lens cleaning (48%), and cleaning the lens case (48%). The lowest levels of compliance were shown in washing hands before lens use (16%) and lens case replacement (16%).

Certain characteristics, which include male gender, smoking, longer contact lens experience, cosmetic type of contact lenses, yearly replacement contact lenses, and pharmacy/beauty store-purchased lenses, were significantly associated with poorer levels of compliance to contact lens care behaviors, as demonstrated in Table 6.
**Discussion**

This study aimed to assess compliance to contact lens wear instructions and evaluate the factors driving noncompliant behaviors among a population of university students in Saudi Arabia. The findings demonstrated compliance rates with an all-inclusive range varying copiously depending on different habits of contact lens care. Washing hands before lens use and lens case replacement were the behaviors that showed the lowest levels of compliance.

Male gender, smoking, longer contact lens experience, cosmetic and yearly replacement types of contact lenses, and lenses purchased at pharmacies/beauty stores were significantly associated with poorer levels of compliance. Believing there is no harm in wearing lenses for longer than the recommended replacement schedule was the primary reason given for overusing contact lenses.

In general, this study’s participants showed moderate levels of compliance with an average compliance rate of 66%. This finding is similar to that of a review published by Claydon and Efron,\(^{[17]}\) and a study assessing compliance among university students in Jordan\(^{[21]}\) and another in Malaysia.\(^{[25]}\)

In contrast, noncompliance tipped the balance in other parts of the world.\(^{[23,26]}\)

**Behaviors with high levels of compliance**

The high level of compliance observed in this study in sharing contacts with others and sleeping/napping with lenses agrees with what was reported in the literature with regard to lens sharing\(^{[1,2,21]}\) and using lenses during naps or overnight sleep.\(^{[1,2,21,22,24,27]}\) In this study, most students only rarely or occasionally used an expired lens solution. This result is consistent with that of a study of Italian teenagers conducted by Abbouda et al.\(^{[28]}\) On the other hand, Yung et al. stated that more than half of the study subjects did not regularly check the expiry dates of their lens care solutions.\(^{[23]}\)

Comparable rates of compliance in cleaning contact lenses with water or saliva have been reported in previous works that inquired about this practice.\(^{[21,22,27,29]}\) A number of studies

![Figure 1: Reasons for using lenses longer than the recommended replacement schedule](image-url)

**Table 3: Contact lens users’ profile (n=150)**

| Type of contact lenses worn       | n (%) |
|-----------------------------------|-------|
| Soft spherical                    | 6 (4.0) |
| Soft toric                        | 3 (2.0) |
| Gas permeable                     | 1 (0.7) |
| Cosmetic                          | 53 (35.3) |
| I do not know                     | 87 (58.0) |

| Modality of contact lenses wear   | n (%) |
|-----------------------------------|-------|
| Daily disposable wear             | 37 (24.7) |
| Monthly replacement               | 35 (23.3) |
| Extended wear (3-6 months)        | 55 (36.7) |
| Yearly replacement                | 23 (15.3) |

| Contact lens care system used     | n (%) |
|-----------------------------------|-------|
| Multiple contact lens solution    | 71 (47.3) |
| Hydrogen peroxide                 | 5 (3.3) |
| Saline                            | 10 (6.7) |
| I do not know                     | 64 (42.7) |

| Contact lens purchased at/from   | n (%) |
|-----------------------------------|-------|
| Optic store                       | 78 (52.0) |
| Internet                          | 10 (6.7) |
| Pharmacy/beauty store             | 48 (32.0) |
| Others                            | 2 (1.3) |

| Contact lens wearing time per day| n (%) |
|-----------------------------------|-------|
| <5 h                              | 33 (22.0) |
| 5-7 h                             | 75 (50.0) |
| 8-12 h                            | 25 (16.7) |
| >12 h                             | 17 (11.3) |

**Table 4: Frequency of compliance to contact lens care behaviors**

|                                | Score 1, n (%) | Score 2, n (%) | Score 3, n (%) | Score 4, n (%) |
|--------------------------------|----------------|----------------|----------------|----------------|
| Sharing contact lenses between users | 135 (90.0)   | 12 (8.0)       | 3 (2.0)        | 0              |
| Sleeping/napping with lenses     | 124 (82.7)    | 19 (12.7)      | 4 (2.7)        | 3 (2.0)        |
| Showering/swimming with lenses   | 114 (76.0)    | 10 (6.7)       | 13 (8.7)       | 13 (8.7)       |
| Overuse of contact lenses        | 44 (29.3)     | 52 (34.7)      | 40 (26.7)      | 14 (9.3)       |
| Keeping the old solution in lens case (topping up) | 56 (37.3) | 50 (33.3) | 32 (21.3) | 12 (8.0) |
| Using lens solution after its expiry date | 101 (67.3) | 29 (19.3) | 17 (11.3) | 3 (2.0) |
| Washing hands before lens use    | 8 (5.3)       | 16 (10.7)      | 31 (20.7)      | 95 (63.3)      |
| Using water/saliva to clean lenses | 121 (80.7) | 7 (4.7)       | 10 (6.7)       | 12 (8.0)       |
| Adherence to/following the instructions of lens cleaning | 37 (24.7) | 35 (23.3) | 32 (21.3) | 46 (30.7) |
| Cleaning and rinsing the lens case | 19 (12.7) | 53 (35.3) | 45 (30.0) | 33 (22.0) |
| Adherence to aftercare visits    | 76 (50.7)     | 43 (28.7)      | 23 (15.3)      | 8 (5.3)        |
| Lens case replacement            | 8 (5.3)       | 16 (10.7)      | 24 (16.0)      | 37 (24.7)      |

Score 1 is total compliance; score 4 is total noncompliance
looked into the rates of lens exposure to water by swimming or showering while wearing contact lenses. Many studies agreed that contact lens wearers are highly compliant to avoiding swimming/showering with lenses;[2,28-31] several others, however, reported moderate-to-poor levels of compliance.[21,27,32,33] The high levels of compliance reported in this study may be because most participants purchased their contact lenses from optic stores which have most likely given them instructions on the wear and care of their lenses.

### Behaviors with moderate levels of compliance
Contrary to the low levels of compliance reported in the literature,[1,21,22,27,33] adherence to aftercare visits showed moderate-to-high levels of compliance in this study. An exception to most of the previous works was that of Philips and Prevade which reported a soaring compliance rate in yearly aftercare follow-ups for patients using soft contact lenses.[34] In accordance with the literature where not replacing lens solution and only topping up has always been there as a behavior with moderate levels of compliance,[18,21,22,27] this study also revealed this practice to be one with moderate levels of compliance. Interestingly, however, very high levels of compliance were observed in a study conducted in Spain during the lockdown due to the coronavirus disease 2019 (COVID-19), highlighting the pandemic’s impact on contact lens wearers’ older habits.[10] The literature showed inconsistencies with regard to reports of contact lens overuse with some studies showing poor levels of compliance[2,13,27,35] others, in line with this study’s results, reporting moderate levels of compliance.[18,21,23] and a number of them even describing high levels of compliance.[30,34,36] The variable levels of compliance reported could be chiefly attributed to differences in the type of contact lenses a study may be limited to, as well as the sample’s demographic and background differences. In line with several recent works,[21,27,30] adherence to lens cleaning instructions was found to be within the moderate range of compliance in the current study. Locally, Alhumaidi and Yousef[24] and Ibrahim et al.[2] reported rates of adherence to instructions of lens cleaning similar to those demonstrated by this study as well. The frequency of cleaning and rinsing the lens case was shown to be in the lower range of moderate compliance in this study, which is a common concern in previous works with some studies even evaluating aspects pertaining to correct lens case cleaning techniques. A study conducted among health-care workers in Pakistan showed similar results in which only a minority of the participants rinsed their contact lens case.[37] A study by Morgan et al. reported that correct case care was practiced among only 4% of wearers.[35] In Spain, wearers of soft reusable contact lenses demonstrated a poor compliance rate to lens case cleaning in addition to practicing a set of nonoptimal cleaning behaviors including rinsing with tap water, wiping with a tissue only, and replacing the solution without wiping/rinsing.[10] Only 7% followed the optimal technique which encompassed rinsing the case with lens solution and wiping it with a clean tissue afterward.

### Table 5: Compliant behaviors associated with contact lens use

| Compliance behavior                                      | Compliance rate, n (%) | Noncompliance rate, n (%) |
|----------------------------------------------------------|------------------------|----------------------------|
| Sharing contact lenses between users                     | 147 (98.0)             | 3 (2.0)                    |
| Sleeping/napping with lenses                             | 143 (95.3)             | 7 (4.7)                    |
| Showering/swimming with lenses                           | 124 (82.7)             | 26 (17.3)                  |
| Overuse of contact lenses                                | 96 (64.0)              | 54 (36.0)                  |
| Keeping the old solution in lens case (topping up)       | 106 (70.7)             | 44 (29.3)                  |
| Using lens solution after its expiry date                | 130 (86.7)             | 20 (13.3)                  |
| Washing hands before lens use                            | 24 (16.0)              | 126 (84.0)                 |
| Using water/saliva to clean lenses                       | 128 (85.3)             | 22 (14.7)                  |
| Adherence to/following the instructions of lens cleaning | 72 (48.0)              | 78 (52.0)                  |
| Cleaning and rinsing the lens case                       | 72 (48.0)              | 78 (52.0)                  |
| Adherence to aftercare visits                            | 119 (79.3)             | 31 (20.7)                  |
| Lens case replacement                                    | 24 (16.0)              | 61 (40.7)                  |

Compliance rate is estimated by the combination of frequencies of scores 1 and 2 from Table 4; noncompliance rate is the combination of frequencies of scores 3 and 4.

### Table 6: Participants’ characteristics associated with poor levels of compliance to contact lens care behaviors

| Characteristics                                    | Noncompliance behavior                                      |
|----------------------------------------------------|-------------------------------------------------------------|
| Male gender                                        | Sleeping/napping with contact lenses (P<0.002)*              |
|                                                   | Showering/sleeping with contact lenses (P=0.018)*             |
|                                                   | Infrequent replacement of contact lens case (P=0.021)*       |
| Smoking                                            | Poor adherence to instructions of lens cleaning (rub, rinse, and soak) (P=0.011)* |
| Contact lens experience of <3 years (<37 months)   | Using water/saliva to clean lenses (P=0.001)*               |
| Longer experience of contact lens wear (3 years and more, i.e., >36 months) | Sleeping/napping with lenses (P=0.045)* |
| Type of contact lens: Cosmetic (colored lenses)     | Using contact lenses longer than recommended (P=0.031)*      |
|                                                   | Using lens solution after expiration (P=0.017)*              |
| Modality of contact lens worn: Yearly replacement lens | Topping up old lens solution in lens case (P=0.001)* |
|                                                   | Use of lens solution after expiration (P=0.001)*             |
|                                                   | Infrequent replacement of lens case (P=0.003)*               |
| Contact lens purchased at pharmacies/beauty stores | Topping up old lens solution in lens case (P=0.001)*         |
|                                                   | Infrequent handwash before lens use (P=0.012)*              |
|                                                   | Using water/saliva to clean lenses (P=0.001)*                |

*Fisher’s exact test, †Chi-square test
Behaviors with low levels of compliance
Behaviors associated with the lowest levels of compliance were handwashing before lens use and lens case replacement. The literature split up regarding reports of hand hygiene before handling contact lenses, with the majority of studies reporting reasonable to high levels of compliance,[18,20,24,27,28,30,37] while others described poor compliance rates.[26,35] Perhaps, the constant reinforcement of the importance of hand hygiene during the COVID-19 pandemic has had an effect and has yet to play a role in the population’s compliance to any hygienic practice in the future. Nonadherence to lens case replacement proved to be one of the least followed behaviors in the literature.[18,23,24,28] Sapkota even found that both medical doctors and subjects with no medical background demonstrated very poor levels of compliance with regard to lens case replacement.[22] This raises the need for practitioners to place more emphasis on the significance of regular replacement of lens cases to contact lens wearers. A summary of the findings presented by previous works is presented in Table 7.

Factors driving noncompliance
Noncompliant behaviors were significantly associated with the male gender rather than the female gender. This finding is expected and consistent with that of previous reports showing evidence of a significant difference between sexes.[24,35] This result may reflect women’s tendency to follow different self-care practices. Smoking was also associated with poor adherence to instructions of lens cleaning, which agrees with the report of Bakkar and Alzghoul showing a relation between smoking and other noncompliant behaviors.[21]

A positive association was found between noncompliance and longer contact lens experience (more than 3 years). This finding agrees with several previous works in the literature with Chun and Weissman[38] and Radford et al.[39] being two of the earliest studies investigating noncompliance in relation to years of contact lens wear. Other reports, however, reported no significant differences in compliance with respect to lens wear experience.[22,26,32,36] Limited contact lens experience (<3 years), on the other hand, was associated with only one form of noncompliance namely using water/saliva to clean lenses.

Participants wearing contact lenses for cosmetic reasons and those purchasing lenses at a pharmacy/beauty store were more likely to carry out different noncompliant behaviors. This may be attributed to the lack of instructions provided to those wearing lenses for cosmetic reasons and the absence of eye care practitioners at pharmacies/beauty stores. This pattern was also observed by Sokol et al. when lenses used for therapeutic purposes were compared to those used for cosmetic reasons.[33]

Modality of contact lenses worn has also shown to have an impact on compliance rate in the current study as yearly replacement lenses were shown to be linked with noncompliant behaviors. However, unfortunately, this has not been investigated closely in the literature.

| Behaviors with low levels of compliance | Current study (%) | Percentage (%) |
|----------------------------------------|-------------------|----------------|
| Handwashing before lens use            | 66                | -              |
| Lens case replacement                   | 75                | -              |

Table 7: Compliance with contact lens wear in different studies

| Compliance with contact lens wear in different studies | Current study (%) | Percentage (%) |
|-------------------------------------------------------|-------------------|----------------|
| Average compliance                                    |                   |                |
| Sharing contact lenses                                 |                   |                |
| Sleeping with lenses                                   |                   |                |
| Swimming with lenses                                   |                   |                |
| Overuse of lenses                                      |                   |                |
| Topping up solution                                    |                   |                |
| Using expired solution                                 |                   |                |
| Washing hands before lens use                          |                   |                |
| Cleaning lens case                                     |                   |                |
| Adherence to aftercare visits                          |                   |                |
| Lens case replacement                                  |                   |                |

References
[18,20,24,27,28,30,37] [26,35] [22,23,24,28] [33] [26,35] [22] [38] [39] [21] [22,26,32,36] [22,26,32,36] [21] [33]
Reasons for using lenses longer than recommended were explored. Most wearers who overused contact lenses were unaware of the harm inflicted by such practice. This reason was similarly picked by about one-third and one-fifth of participants in studies by Dumbleton et al. [36] and Vianya-Estopa et al. [30] respectively. This is in a way promising as raising awareness and reinforcing the importance of compliance with lens replacement schedules should be able to resolve a substantial part of this issue. In contrast, a significant number of contact lens wearers in other parts of the world overused their lenses to save money [15,30,36], which was not an issue for most of our study population.

Several limitations should be noted when interpreting this study’s findings. This is a single-centered study including only health-care students, which may not necessarily represent the practices of less-educated contact lens wearers or health-care students living elsewhere in Saudi Arabia. Furthermore, using an online route for dissemination can be a problem in that it cannot be confirmed that all respondents understood all the survey’s questions before submission. Despite these limitations, the findings are of paramount importance and a great addition to the literature as this is considered the first study to assess compliance to contact lens care in addition to exploring factors driving noncompliance in Saudi Arabia. The analysis provided of factors impacting compliance should be able to bridge past works of noncompliance reportage to future researchers, directing them to focus their attention to answer the question of the utmost importance “how to improve compliance?”

**Conclusions**

The study concluded that a relatively high percentage of contact lens wearers in a Saudi university of health-care students displayed some degree of noncompliance to contact lens care behaviors. Lack of compliance in handwashing before handling contact lenses and replacement of lens case showed to be a matter of highest concern. Male gender, smoking, longer contact lens experience, cosmetic and yearly replacement types of lenses, and site of purchase being a pharmacy or a beauty store were associated with poor compliance behaviors. The findings should, therefore, prompt eye practitioners to provide ample instructions regarding contact lens care and mention the importance of compliance to lens care practices. The conduction of further studies is advocated to clarify whether the implementation of such recommendations would improve compliance to contact lens care guidelines in Saudi Arabia.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Abahussin M, AlAnazi M, Ogbuehi KC, Osuagwu UL. Prevalence, use and sale of contact lenses in Saudi Arabia. Survey on university women and non-ophtalmic stores. Cont Lens Anterior Eye 2014;37:185-90.
2. Ibrahim NK, Seraj H, Khan R, Baabdullah M, Reda L. Prevalence, habits and outcomes of using contact lenses among medical students. Pak J Med Sci 2018;34:1429-34.
3. Erje JC, Nevitt MP, Hodge DO, Ballard DJ. Incidence of ulcerative keratitis in a defined population from 1950 through 1988. Arch Ophthalmol 1993;111:1665-71.
4. Ailpour F, Khaheshi S, Soleimanzadeh M, Heidarzadeh S, Heydarzadeh S. Contact lens-related complications: A review. J Ophthalmic Vis Res 2017;12:193-204.
5. Lim CH, Stapleton F, Mehta JS. Review of contact lens-related complications. Eye Contact Lenses 2018;44 Suppl 2:S1-10.
6. Green M, Apel A, Stapleton F. Risk factors and causative organisms in microbial keratitis. Cornea 2008;27:22-7.
7. Dart JK, Stapleton F, Minassian D. Contact lenses and other risk factors in microbial keratitis. Lancet 1991;338:650-3.
8. Bourcier T, Thomas F, Borderie V, Chaumeil C, Laroche M. Bacterial keratitis: Predisposing factors, clinical and microbiological review of 300 cases. Br J Ophthalmol 2003;87:834-8.
9. Collier SA, Gronostaj MP, MacGurn AK, Cope JR, Awsumb KL, Yoder JS, et al. Estimated burden of keratitis – United States, 2010. MMWR Morb Mortal Wkly Rep 2014;63:1027-30.
10. Ung L, Bispo PJ, Shanbhag SS, Gilmore MS, Chodosh J. The persistent dilemma of microbial keratitis: Global burden, diagnosis, and antimicrobial resistance. Surv Ophthalmol 2019;64:255-71.
11. Dart JK. Predisposing factors in microbial keratitis: The significance of contact lens wear. Br J Ophthalmol 1988;72:926-30.
12. Abdelkader A. Cosmetic soft contact lens associated ulcerative keratitis in southern Saudi Arabia. Middle East Afr J Ophthalmol 2014;21:232-5.
13. Dumbleton KA, Woods CA, Jones LW, Fonn D. The relationship between compliance with lens replacement and contact lens-related problems in silicone hydrogel wearers. Cont Lens Anterior Eye 2011;34:216-22.
14. Lim CH, Carnt NA, Farook M, Lam J, Tan DT, Mehta JS, et al. Risk factors for contact lens-related microbial keratitis in Singapore. Eye (Lond) 2016;30:447-55.
15. Contact Lens Care: You’re Probably Doing It Wrong – American Academy of Ophthalmology. Available from: https://www.aao.org/newsroom/news-releases/detail/contact-lens-care-you-re-probably-doing-it-wrong. [Last accessed on 2021 May 31].
16. Protect Your Eyes | Contact Lenses | CDC. Available form: https://www.cdc.gov/contactlenses/protect-your-eyes.html. [Last accessed on 2021 May 31].
17. Claydon BE, Efрон N. Non-compliance in contact lens wear. Ophthalmic Physiol Opt 1994;14:356-64.
18. Contact Lens Compliance and Reducing the Risk of Keratitis – Optician. Available from: https://www.opticianonlinenet/features/contact-lens-compliance-and-reducing-the-risk-of-keratitis. [Last accessed on 2021 May 31].
19. Huraib SM, Bakkar S, Abdujawad K, Huraib H, Alrehaily H. Compliance with hygiene rules related to use of contact lenses and its impact among users: A cross-sectional study. Orij Res Artic 2017;233:233-74.
20. Alobaidan OS, Alkhalifah MK, AlSayegh AA, Alhumaid FA, Ashammyr AS, Alghamdi K, et al. Knowledge and practice regarding contact lens among Saudi urban contact lens users. Saudi J Ophthalmol 2018;32:93-6.
21. Bakkar MM, Alzghoul EA. Assessment of compliance with contact lens wear and care among university-based population in Jordan. Cont Lens Anterior Eye 2020;43:395-401.
22. Sankota K. Level of compliance in contact lens wearing medical doctors in Nepal. Cont Lens Anterior Eye 2015;38:456-60.
23. Chung AM, Boost MV, Cho P, Yap M. The effect of a compliance...
enhancement strategy (self-review) on the level of lens care compliance and contamination of contact lenses and lens care accessories. Clin Exp Optom 2007;90:190-202.
24. Alhumaidi RA, Yousef KH. Impact of using contact lenses with hygiene rules in Saudi Arabia. Egypt J Hosp Med 2018;72:5313-20.
25. Raja Lexshimi RG, Najibah AR, Zahari T, Keat LW, Linger S, Ismail NA, et al. Knowledge, compliance and complication of contact lens usage among medical students in universiti Kebangsaan Malaysia medical centre. Malays J Public Heal Med 2020;20:229-34.
26. Jun J, Zhiwen B, Feifu W, Lili L, Fan L. Level of compliance in orthokeratology. Eye Contact Lns 2018;44:330-4.
27. García-Ayuso D, Moya-Rodríguez E, Valiente-Soriano FJ, Galindo-Romero C, Sobrado-Calvo P, Di Pierdomenico J. University students fail to comply with contact lens care. Contact Lens Anterior Eye 2022;45:101411.
28. Abbouda A, Restivo L, Bruscolini A, Pirraglia MP, De Marco F, La Cava M, et al. Contact lens care among teenage students in Italy: A cross-sectional study. Semin Ophthalmol 2016;31:226-32.
29. Arshad M, Carnt N, Tan J, Stapleton F. Compliance behaviour change in contact lens wearers: A randomised controlled trial. Eye (Lond) 2021;35:988-95.
30. Vianya-Estopa M, Garcia-Porta N, Piñero DP, Simo Mannion L, BeukesEW, WolffsohnJS, et al. Contact lens wear and care in Spain during the COVID-19 pandemic. Contact Lens Anterior Eye 2020;44:101381.
31. Herman CL. An FDA survey of US contact lens wearers. Contact Lens Spectr 1987;2:89-92.
32. Bui TH, Cavanagh HD, Robertson DM. Patient compliance during contact lens wear: Perceptions, awareness, and behavior. Eye Contact Lens 2010;36:334-9.
33. Sokol JL, Mier MG, Bloom S, Asbell PA. A study of patient compliance in a contact lens-wearing population. CLAO J 1990;16:209-13.
34. Phillips LJ, Prevade SL. Replacement and care compliance in a planned replacement contact lens program. J Am Optom Assoc 1993;64:201-5.
35. Morgan PB, Efron N, Toshida H, Niehols JJ. An international analysis of contact lens compliance. Cont Lens Anterior Eye 2011;34:223-8.
36. Dumbleton KA, Richter D, Woods CA, Aakre BM, Plowright A, Morgan PB, et al. A multi-country assessment of compliance with daily disposable contact lens wear. Cont Lens Anterior Eye 2013;36:304-12.
37. 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.
38. Chun MW, Weissman BA. Compliance in contact lens care. Am J Optom Physiol Opt 1987;64:274-6.
39. Radford CF, Woodward EG, Stapleton F. Contact lens hygiene compliance in a university population. J Br Contact Lens Assoc 1993;16:105-11.