Causes of non-compliance among the young adults in West Delhi region

Vijay Chugh[1*], Tejinder Singh Ahluwalia[2], Pradeep Kumar Sainia[3], Himanshu Tripathi[4], Aarushi Chugh[5], Vanshika Chugh[6]

[1,4]Dept. of Optometry, NIMS College of Paramedical Technology, NIMS University Rajasthan, Jaipur 303121 India

[2]Dept. of Ophthalmology, NIMS SUPER-SPECIALTY HOSPITAL. Jaipur-Delhi Highway (NH-11C), Jaipur – 303121,

[3]Prakash Eye & Laser Centre, Delhi

[5] Dept. of Paramedical Sciences, Jamia Hamdard, New Delhi, India

[6] School of Pharmaceutical Sciences & Research, Jamia Hamdard, New Delhi, India

Corresponding Author: Mr. Vijay Chugh, Dept. of Optometry, NIMS College of Paramedical Technology, NIMS University Rajasthan, Jaipur 303121 India

Email: vijaychugh2011@gmail.com

Abstract

Background: Nowadays, the usage of contact lens is increasing day by day because of their high reliability and comfort. It is found that most of the contact lens users are unaware of their harmful effects and complications caused by them. Furthermore, the harmful effects are found to be linked with non-compliance with care and maintenance of contact lenses. **Materials & Methods:** The study was conducted in 240 young adults at private optometric clinic in West Delhi. Self-administered and validated questionnaire was used to find out the rate of non-compliance and data was analyzed using the SPSS (Version 20.0), MS excel and GraphPad Prism 8.4.3. A p value of < 0.05 was taken as significant. **Results:** Out of 240 contact lens users only 172 (71.67%) have shown the non-compliance All (240) have highest non-compliance in category 3; Care of contact lens accessories, of 58% followed by non-compliance in category 1 (30%) and lowest non-compliance in category 2 (15%). **Conclusion:** The study concluded a high non-compliance behavior in the urban population of West Delhi; highest being in the care of contact lens accessories.

Introduction

The invention of contact lens has revolutionized in field of Optometry. Soon after their invention contact lens become so much popular that their market size in India is expected to be doubled in next 10 years from USD 0.27 Million in 2025 to USD 0.56 Million in 2029 with a compound annual growth rate (CAGR) of 8.2%. [1] This increase is because of the easiness and reliability of contact lens both for the refractive correction as well as cosmetic purposes. [2, 3] However every prose has its cons also and same is with the use of contact lenses, if they are not used with care and recommendations, they may cause serious eye illness like keratitis (most common) [4] and even in the more severe case as blindness. [5, 6] The most common reason behind these complications is non-compliant behavior towards their usage and maintenance

like use them for longer duration, overnight use, and use during showering, swimming and mishandling of the lenses or unable to follow instructions from eye care professionals [7, 8]. Many studies have been conducted worldwide which have shown a higher rate of non-compliance. A few studies have been conducted in India to find the rate of non-compliance. One of such study , conducted by Noushad et al. [9] has shown a higher rate of non-compliance of 66%. In the present study we have tried to find out some common factors which may result into the non-compliant behavior especially in urban population. We have assessed the young adults from West Delhi region for their wearing habits and also used a self-administered questionnaire for finding their non-compliant behavior toward the use and maintenance of contact lenses. The aim of this study was to find the reasons behind the non-compliant behavior in urban population of West Delhi.

Methods

Study Design

The study was a cross-sectional study involving 240 human subjects who had been wearing contact lenses regularly for at least six months. Both genders were included in the study, and the participants ranged in age from 18 to 25 years. The participants were recruited from October 2022 to September 2023 and assessed at our Optometric Clinic in West Delhi and those who did not have any underlying systemic or ocular conditions that could impair the ocular surface or make it difficult to wear contact lenses, were chosen for the study. The data of participant's demographic information and wearing habits was gathered. A self-administered, semi-structured questionnaire, created specifically for the study was used to evaluate the non-compliance behavior in the recruited subjects.

The Questionnaire

Assessment of non-compliance behavior was done by their wearing habits and a self-administered, validated questionnaire. Each participant was asked to complete the questionnaire (Appendix I) which was having both 70% positive and 30% negative questions. All the questions were classified into three categories [9].

Category – I: Wearing and replacement habits

Category – II: Lens cleaning and disinfecting procedures

Category – III: Care of contact lens accessories

Items included in the questionnaire were adapted from a published questionnaire. [10] The questionnaire was validated by a separate pilot study in 30 young adults with a gap of one month. The reliability analysis of the questionnaire has shown 0.97 (Cronbach's alpha) with 95% CI (0.61).

A rating scale ranging from 1 to 4 was used to grade each question's response. The responses "always/daily" (total compliance), "often," "sometimes," and "never" (total non-compliance) received scores of four, three, two, and one, respectively. A few negative questions are also included in the questionnaire (3, 5, 7, 11, and 17). At the time of analysis, selecting "never" received a score of four, selecting "sometimes" a score of three, selecting "often" a score of two, and selecting "always" a score of one. As a result, answering "never" to the negative questions meant complete compliance, whereas answering "always" meant complete non-

compliance. The subjects were instructed not to score higher than two if they were not carrying out a particular procedure at least half of the time. It would be challenging to expect someone to follow manufacturer and clinician guidelines exactly. However, if a subject is mainly following the lens care instructions, then the likelihood of a serious complication occurring is very low and vice-versa. Therefore, if subject's compliance score was lesser than 3, they were considered "Non-Compliant" for that lens care procedure. The average score of the responses was determined in order to determine the degree of non-compliance in each lens care category (Category I, Category II, and Category III). A score less than three qualified the subject as non-compliant in that category.

A participant's overall level of non-compliance was evaluated following the computation of their individual non-compliance score for each of the three categories. A participant was deemed "Non-Compliant" if they received a score of less than 3 in each of the three lens care categories.

Sample Size

The SRS (Simple Random Sampling) method, which gives each participant an equal chance of being selected for the study, was used to determine the sample size. The following formula is used in the SRS method to determine the sample size for an observational cross-sectional study. [11]

$$n = (Z^2 \times P \times (1-P)) / d^2$$

The sample size comes out to be 240 at a CI of 95% and non-compliance rate of 66% from the previous study [9].

Ethical Considerations

The Institutional Ethics Committee has granted the ethical approval prior to the study's start. Each participant received a consent form acknowledging that their participation was voluntary and that they could leave the study at any time. Codes of ethics outlined by the Declaration of Helsinki [12] were followed during the entire course of the study,

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) software, version 20, was used for statistical analysis after compiling the data in Microsoft Office Excel. Age and other quantitative variables were displayed as means with standard deviations. Frequencies and percentages, among other suitable descriptive statistics, were used to summarize the qualitative variables. Chi-square test was used for the comparisons of categorical variables and a p value of < 0.05 was considered to be statistically significant.

Results

A total of 240 participants were recruited for the study from the West Delhi region. Out of 240 participants, 69 (28.75%) were males while remaining 171 (71.25%) were females. The mean (SD) age of the participants was 21.51 (2.21) yrs. Demographic characteristics of the participants are given in the table 1.

Table 1 Demographic characteristics of the Study sample (n=240)

Parameters	Values
Age in years	21.51 ± 2.21

Gender:	
Male	69 (28.75%)
Female	171 (71.25%)
Duration of use (hours/day):	11.54 ±1.91
Male	11.58 ± 2.43
Female	11.53 ±1.66

Out of 240, 172 participants (72%) were not compliant and the remaining 28% were compliant to their contact lens use and maintenance. The mean (SD) duration of their daily usage was 11.54 (1.91) hours. In this study the male participants were found to use the lenses slightly more than females, which was not significant statistically (p = 0.8448) (Figure 1).

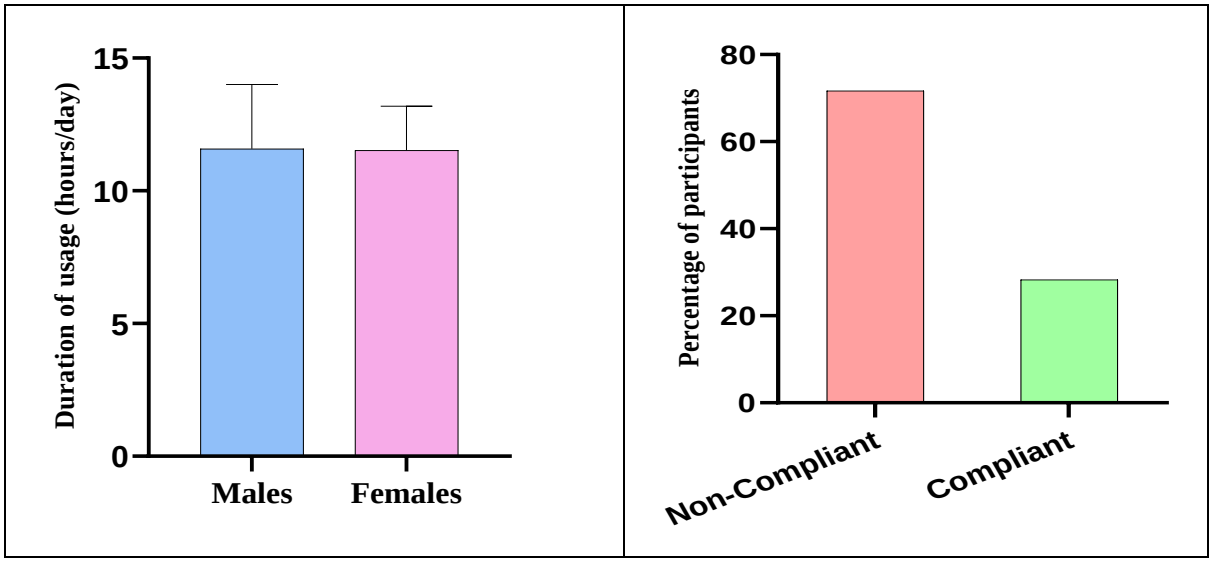

Figure 1: Comparison of duration of use of lenses (left) and compliance behavior

The questionnaire was having three categories. The category 1 and 3 were having 5 questions each while the category 2 was having 7 questions. A participant was considered as non-compliant for an item (question) if he/she was having a score of less than 3. The category wise per question comparison was done to find the most common items for non-compliant behavior.

Table 2: Categorical question wise comparison of questionnaire

Category	Questions	Mean ± SD
Category 1	Wear lenses for same time as recommended	3.36 ± 0.66
	Wear protective glasses to protect from dust	3.08 ± 0.99
	Wear contact lenses even after feeling discomfort	3.35 ± 0.70
	Attend after care visits as recommended	2.14 ± 0.41
	Sleep overnight with your lenses on	3.44 ± 0.59

Category 2	Wash hands before handling the contact lenses	3.91 ± 0.29
	Use tap water for the cleaning lenses	3.88 ± 0.33
	Clean lenses with solution every day after removing	3.06 ± 0.38
	Rub lenses using solution on both sides after cleaning	1.80 ± 0.83
	Rinse lenses with solution after rubbing	1.28 ± 0.62
	Top off (adding) solution to lens case	3.75 ± 0.60
	Soak lenses with fresh solution for minimum of 4 hrs	3.79 ± 0.56
Category 3	Change contact lens case every 3 months	2.45 ± 0.64
	Clean contact lens case with anti-septic solution	2.41 ± 0.69
	Allow lens case to air dry	2.28 ± 0.66
	Check the discard-after dates of the solution	3.10 ± 0.42
	Share contact lens case with friends or relatives	3.95 ± 0.22

It was found that most common reason for the non-compliant behavior in category1 was the lack of 'after-care visits suggested by contact lens practitioner'. The average score for this question was 2.14 ± 0.41, less than 3, indicating a non-compliance behavior. All the other items in the category 1 have shown a good compliance rate (Figure 2).

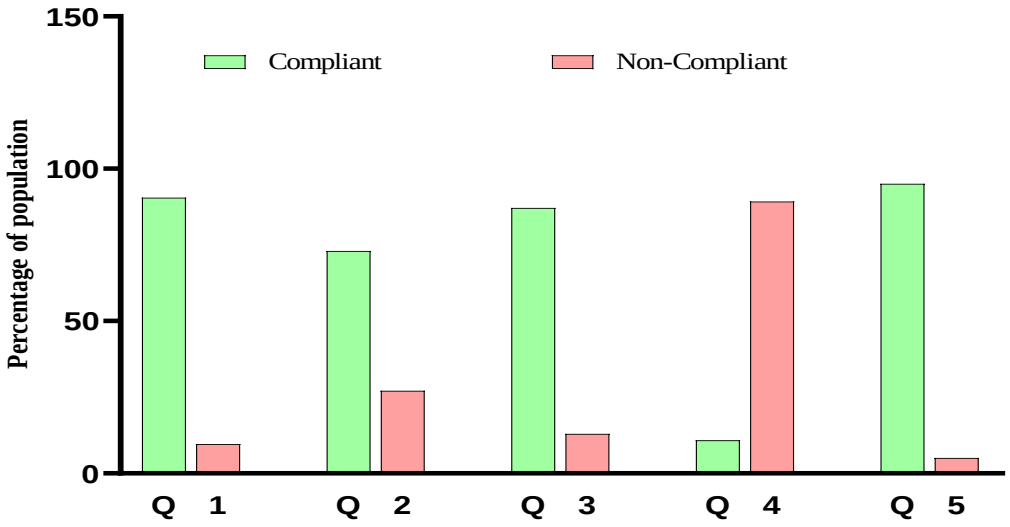

Figure 2: Per question comparison of Category1 (Wearing & replacement habits)

Similarly, when per question comparison was done for the category 2, it was found that the factors responsible for the non-compliant behavior were caring of contact lenses; 'rubbing the lenses using solution on both sides every time after cleaning' and 'rinsing of the lenses with solution after rubbing'. Out of these two factors the 'rinsing of the lenses with solution after use', being the most common factor for the non-compliant behavior. While the washing of hands and use of tap water for cleaning have no contribution in the non-compliance behavior i.e. these two parameters shows a 0% non-compliance rate (Figure 3).

Figure 3: Per question comparison of Category2 (Lens cleaning and disinfecting procedures)

Maximum number of items showing the non-compliance behavior was from the category 3 of the questionnaire. However, the percentage of the participants, showing the non-compliance behavior was lesser than that of in category 2 &1. The factors responsible for the non-compliance behavior were; 'change of contact lens case', 'disinfecting of the contact lens case' and 'air drying of the contact lens case'. The participants have shown 0% non-compliance in terms of 'sharing of their contact lenses' and a very low non-compliance behavior of 2.5% in terms of 'discard after date of the multipurpose solution' (Figure 4)

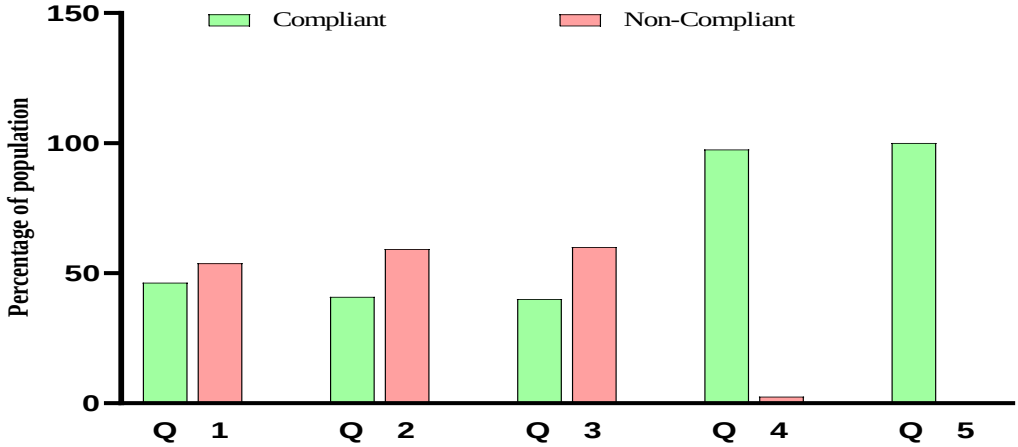

Figure 4: Per question comparison of Category3 (Care of Contact lens accessories)

In all the three categories no significant difference was observed between the males and females in terms of duration of use in each category. However when score per question average was compared using the ANOVA in each category then a significant difference was observed (p value < 0.001). Also the category 3 was having the lowest average score followed by category 2 and highest in category 1. Category wise compliance have shown a highest non-compliance in category 3 (58%) followed by non-compliance in category 1 (30%) and lowest non-compliance in category 2 (15%).

Discussion

This study has shown a very high non-compliance rate in population of West Delhi region (72%). The higher non-compliance rate is however common and shown worldwide in the population [13]. In a similar study by Noushad B et al. [9] 2012, similar type of results was observed where a high non-compliance rate of 66% was found in university students of South India. The assessment of the non-compliance rate was also based on the self administered questionnaire. Oliviera et al.[14] also used a questionnaire alone to study compliance in college students and health workers. Higher rates of non-compliance were also noted by earlier researchers (Collins et al. [15], - 22%; Morgan [16] –35%; Collins & Carney [17] –16%; Turner et al., [18]–40%; Yung & Boost [19] –35%; García-Ayuso D [20] Raja Lexshimi RG [21] – 24.4%). Highest non-compliance was observed in maintenance of lens care accessories. Bakkar MM et al., [22] however observed a very high compliance rate of 75% in university students of Jordan, which was in contrast to our findings. Ishak B et al., [23] also observed the overall good compliance rate in Malay population without any significant difference of knowledge [24] about the contact lens care, on the compliance rate. While a study during COVID-19 by Ectopa MV et al., [25] 2020 recommended to educate the contact lens wearers about the care and maintenance to decrease the level of non-compliance in the population.

Conclusion

Most of the participant in this study who wears contact lenses has shown some degree of non-compliance with their prescribed care routine. This non-compliance, however, differed in terms of lens care accessory maintenance and hygienic practices. The greatest level of non-compliance was found in the care and maintenance of lens accessories, such as contact lens cases and solutions. Although improving participants behavior to the ideal level is very difficult, primary eye care providers must emphasize all lens care instructions and reiterate them at follow-up visits to minimize lens contamination and potential ocular complications which would decrease the non-compliance behavior and also the complications associated with them thus increasing the acceptability and use of contact lenses with greater care and attention.

Acknowledgement

I would like to thank my co-authors for their timely contribution.

Conflicts of interest

There are no conflicts of interest.

References

1. Source: https://www.marketresearchfuture.com/reports/india-contact-lenses-manufacturers-market-20723

2. Abahussin M, AlAnazi M, Ogbuehi KC, Osuagwu UL. Prevalence, use and sale of contact lenses in Saudi Arabia: Survey on university women and non-ophthalmic stores. Cont Lens Anterior Eye 2014;37:185-90.
3. 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.
4. 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.
5. Green M, Apel A, Stapleton F. Risk factors and causative organisms in microbial keratitis. Cornea 2008;27:22-7.
6. Dart JK. Predisposing factors in microbial keratitis: The significance of contact lens wear. Br J Ophthalmol 1988;72:926-30.
7. 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.
8. 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.
9. Noushad B. Contact lens compliance among a group of young, university-based lens users in South India. AMJ. 2012 Apr 1; 5(3):168–74.
10. Yung 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(3):190-202.
11. Daniel WW, editor. 7th ed. New York: John Wiley & Sons; 1999. Biostatistics: a foundation for analysis in the health sciences.
12. Goodyear MD, Krleza-Jeric K, Lemmens T. The Declaration of Helsinki. BMJ. 2007 Sep 29;335(7621):624-5.
13. Mingo-Botín D, Zamora J, Arnalich-Montiel F, Muñoz-Negrete FJ. Characteristics, Behaviors, and Awareness of Contact Lens Wearers Purchasing Lenses Over the Internet. Eye & Contact Lens: Science & Clinical Practice. 2020 Jul;46(4):208–13.
14. de Oliveira PR, Temporini-Nastari ER, Ruiz Alves M, Kara-Jose N. Self-Evaluation of contact lens wearing and care by college students and health care workers. Eye Contact Lens 2003;29(3):164-7
15. Collins M, Shuley V, Coulson J, Bruce A. Initial compliance with lens care instructions. Clin Exp Optom 1993;76:115-188
16. Morgan P. Contact lens compliance and reducing the risk of keratitis. Online. http://www.siliconehydrogels.org/editorials/mar_08.asp (last accessed 21/01/2025)
17. Collins MJ, Carney LG. Compliance with care and maintenance procedures amongst contact lens wearers. Clin Exp Optom 1986;69(5):174-7
18. Turner FD, Gower LA, Stein JM, Sager DP, Amin D. Compliance and contact lens care: A new assessment method. Optom Vis Sci 1993;70(12):998-1004

19. Yung 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(3):190-202.
20. 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
21. 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.
22. 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.
23. Ishak B, Azizan ANA, Knowledge and Compliance among Contact Lens Wearers Living in Kuala Lumpur, Malaysia: A Cross-Sectional Study. MJMS. 2022 Oct 28;29(5):126–32.
24. 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.
25. Vianya-Estopa M, Garcia-Porta N, Piñero DP, Simo Mannion L, BeukesEW, WolffsohnJS, etal. Contact lens wear and care in Spain during the COVID-19 pandemic. Contact Lens Anterior Eye 2020;44: 101381.