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COMPARISON OF KNOWLEDGE, ATTITUDE, AND PRACTICES TOWARDS CL USAGE AMONGST MEDICAL AND NON-MEDICAL STUDENTS

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ABSTRACT

Background and Objective: Amidst the myopia epidemic, the number of contact lens (CL) users is steadily increasing, especially youngsters. Many CL practitioners presume optimum knowledge and good practice of CL usage by medical professionals. With rising complications and a significant dropout rate, there is a need to investigate the knowledge (K), attitudes (A), and practices (P) among CL users. This study aimed to assess the K, A, and P in CL users registered in various programs in a university. We hypothesized no difference between K, A, and P in CL users with medical (M) and non-medical (N) academic backgrounds.
Methods and Materials: A pre-validated questionnaire, consisting of 19 questions on knowledge, 9 questions on attitude, and 30 questions on practice, was distributed among the university students admitted to various programs, excluding optometry, through an online survey tool. Inferences were drawn using a Chi-square test and Mann-Whitney U test to compare the M and N groups, with a predetermined significance of 0.05. Spearman's correlation gave a relationship between the K, A, and P of CL users.
Results: Out of 1041 (M=146 and N=895) valid responses, 476 (45.7%) respondents had prior experience or were CL users. The prevalence of CL users was a little higher in the N group (M=39.0%; N=46.8%) but statistically not significant (χ^2=3.057, df=1, $p>0.05$). The knowledge about CL hygiene and complications was not significantly different between the two groups (U=10370, z=–1.645, $p>0.05$). However, there was a significant difference in the attitude towards CL wear and care (U=9268, z= –2.751, $p<0.05$) and practice of lens wear and care (U=8770, z=–3.318, p<0.05). For all the respondents, a weak correlation between knowledge and practice was observed (r=0.137, p<0.05), and a fair to strong correlation in medical respondents (r=0.465, p<0.05). For the non-medical student group, a statistically significant weak correlation was found between attitude and practice (r=0.110, p<0.05).

Conclusion: Medical students exhibited a slightly better attitude and practice toward CL use than non-medical students. However, knowledge scores in both groups were similar. The results of this survey disrupted the presumption that CL users with medical backgrounds possess better K, A, and P toward CL usage. This study highlights the need to be proactive in educating young CL wearers, irrespective of their academic background, providing them with optimum knowledge and skill, and nurturing their right attitude towards CL usage, which will ultimately contribute to the optimization of eye health outcomes and prevention of complications associated with CL wear. This will help the CL industry overcome growth challenges, providing safe opportunities for vision correction to the increasingly prevalent myopic population at large.

Keywords: Contact lenses, medical student, non-medical student, knowledge, attitude, practices, CL complication, vision correction, myopia

INTRODUCTION

The number of young contact lens (CL) users is rising daily because of the convenience and cosmetic enhancements they offer, compared to wearing spectacles.[1] The popularity of CLs is growing because of improved availability, comfortable wear, enhanced cosmetic appearance, and affordable costs, particularly among university students.[2,3] CLs are one of the optical instruments commonly used to correct refractive errors and for cosmetic and therapeutic reasons.[4] Conventionally, CLs are dispensed by competent CL practitioners such as optometrists, ensuring optimum in situ performance and training in lens handling and care for healthy and comfortable wear.[5] In recent years, especially post-COVID-19, the market share of online stores in sales of CLs and their care products is on the rise and growing at a compound annual growth rate of 5.5%.[6] This can be alarming as CL users lose one-to-one contact and professional supervision that ensures healthy CL practice.

Irrespective of the mode of procurement of CLs, the responsibility of everyday cleaning and maintenance for their safe use lies with the wearer.[7] CL wearers may expose themselves to a potential risk of eye infections if they fail to follow standard prescribed guidelines of safe wear.[8] Dry eyes, corneal edema, corneal ulcer, conjunctivitis, and keratitis are some major ocular health problems CL wearers experience because of negligence in CL care.[9] Cope et al. (2015) reported that over 99% of 41 million American CL wearers exhibit at least one behaviour that exposed them to the risk of CL complications. Non-compliance to the prescribed guidelines is thus the most common issue among CL wearers, leading to a substantial number of CL dropouts.[10]

Patient education for ocular health and safe CL usage is inevitable to ensure appropriate behavior and minimize the risk of CL complications. Eye care practitioners must critically assess CL users' practice patterns to ensure appropriate behaviour, following the dos and don'ts of CL wear. Young CL users are less aware of the complications related to CLs.[11] With the increasing trend of young CL users, understanding their perceptions, knowledge, habits, and practices in CL care is imperative to ensure safe CL wear and maintain long-term ocular health. One of the good measures of effective ocular health education is the self-reported perception of knowledge, practice, and attitude regarding one's CL usage.[12]

Most university students are young adults with a higher risk of CL complications due to greater mobility, extended active hours, increased use of digital screens, and a casual approach to overall health.[13–15] They gather knowledge through various sources such as information brochures, advertisements, online blogs, vlogs, and other social media. Attitude and practice of CL usage among university students are strongly related to the sources of the knowledge.[16] Since medical students rigorously study anatomy, physiology, biochemistry, pathology, pharmacology, ocular diseases, and many

other related syllabi, they are expected to have more scientific knowledge. They are presumed to demonstrate better attitudes and practices of CL usage. Further, they are expected to know CL-related ocular complications and, therefore, follow exceptionally hygienic wearing practices compared to other youngsters.[17] However, this conviction needs scientific verification. Hence, the purpose of this study was to compare the knowledge (K), attitude (A), and practice (P) of CLs among medical (M) and non-medical (N) undergraduate university students.

METHODS

Study Design

The research was a cross-sectional, online questionnaire-based study involving students of various academic programs enrolled in the university.

Ethics Approval

The study was approved by the University's Research and Innovation Management Centre (RIMC) and was conducted under the Declaration of Helsinki.

Study Population

University students who are active CL users or had experience of wearing CLs were enrolled in this study. To analyze this study, we classified them into two groups: the medical student group (M) and the non-medical student group (N). A medical student is defined as an undergraduate student who is enrolled in health science courses such as dentistry, medicine, pharmacy, and other health science courses, while a non-medical student is an undergraduate student who is enrolled in non-health science courses such as business and accounting, early childhood care and education, engineering, law, technology, and innovation, etc. However, students who are studying optometry or have any optical background and are trained in eyecare and CL practice were excluded from the study to avoid the curse of expertise in results.

Sample Size Calculation

We hypothesized no difference in K, A, and P for CL usage in medical and non-medical students. The sample size for each group, medical and non-medical students, was calculated using a stratified sampling method based on the ratio of university enrolment.[18] The strata sample sizes for medical and non-medical students were 57 and 419, respectively, and 476 students.

Survey Instrument

A pilot-tested and pre-validated closed-end questionnaire[19] was administered to assess university students' level of K, A, and P of CL care [Appendix I]. The questionnaire was converted to an e-survey and distributed by posting it on the university's Learning Management System (Blackboard), which is accessible to the university students. The participants were registered with informed consent and then were asked to respond to a questionnaire through a Google form link. There were four sections in the questionnaire. The first section covered the demographic details, while the second section consisted of a total of 19 questions regarding the level of knowledge of CLs. Section 3 consisted of 9 questions with a 5-point Likert scale for documentation of attitudes towards CL wear and care, while section 4 consisted of 30 questions on the practices related to CL wear and care. The questionnaire was in English, and all the questions were set as compulsory to be answered. Participants were not permitted to proceed if any questions were left out in any section. Participants were allowed to go back to previous sections and modify their choices before the final submission of their responses.

Statistical Analysis

Data was auto-tabulated in Microsoft Excel 2016, and results were analyzed using Statistical Package for Social Sciences (SPSS version 27.0). Scores were assigned to correct answers to the questions related to CL use in K, A, and P categories. The data were presented using descriptive statistics. To compare results between the two study groups, the Chi-square test was performed with a

predetermined significance level of 0.05. Adjusted residuals in Post Hoc analysis gave the specific variables of significant differences.[20] Spearman's correlation (r) was computed to find the relationship between the K, A, and P in all CL users and within each group of participants.

RESULTS

Demographics

A total of 1041 respondents between the ages of 18 and 29 completed the questionnaire. Among them, 476 respondents (45.7%) were CL users. Table 1 compares medical (M) and non-medical (N) students in demographic parameters. There was a statistically significant age difference (χ^2=9.116, df=1, p=.003) and gender (χ^2=8.334, df=1, p=.004) of respondents between the two groups. The prevalence of CL users was higher in the N group (M=39.0%; N=46.8%) although statistically not significant (χ^2=3.057, df=1, p=.080).

Profile of CL Users

Out of 1041 respondents, 476 were CL users. This is attributed to the 45.7% prevalence of CL users in the study population. Table 2 shows the pattern of CL wear between the two groups. Vision correction was the prime purpose of CL wear reported by both groups (M 42.1%, N=38.4%, χ^2=6.865, df=3, p=.076). Among the N group, 38.2% were new users, and there was a significant difference in the duration of CL wear between the two groups (χ^2 =12.673, df=5, p=.027). Although the maximum number of respondents in both groups (M=78.9%, N=62.8%) reported the use of soft CL, a statistically significant difference was seen in their knowledge about the type of CL they were using (χ^2=6.046, df=2, p=.049). The majority of M students (54.4%) reported procurement from CL practitioners. A significant difference was seen in both groups on the place of procurement of CLs (χ^2=19.697, df=4, p=.001).

KEY OBSERVATIONS AMONG THE CL USERS BETWEEN THE M AND N GROUPS

Knowledge

Interestingly, in both groups, a similar proportion of respondents reported the brand name of the lens they were wearing (M=66.66%, N=65.15%) and the cleaning solution they were using (M=80.70%, N=76.37%). A significantly higher proportion of the

TABLE 1 Comparison Between Medical and Non-medical Respondents in Demographic Parameters.

	All respondents	Medical student group (M)	Non-medical student group (N)	*p*-value
No of respondents	1041	146 (14%)	895 (86%)	
Age				
18–23	601 (57.7%)	101 (55.9%)	500 (69.2%)	0.003*
24–29	440 (42.3%)	45 (44.1%)	395 (30.8%)	
Gender				
Female	577 (55.4%)	97 (66.4%)	480 (53.6%)	0.004*
Male	464 (44.6%)	49 (33.6%)	415 (46.4%)	
CL User				
Yes	476 (45.7%)	57 (39.0%)	419 (46.8%)	0.080
No	565 (54.3%)	89 (61.0%)	476 (53.2%)	

** Significance level p<0.05.*

TABLE 2 Comparison of the Profile of CL Users.

	Total CL users	Medical student group (M)	Non-medical student group (N)	*p*-value
No. of respondents	476	57 (12%)	419 (88%)	-
Purpose of wearing CLs				
Vision correction	185 (38.9%)	24 (42.1%)	161 (38.4%)	0.076
Cosmetic reason	102 (28.4%)	16 (28.1%)	86 (20.5%)	
Both vision correction and cosmetic reasons	108 (22.7%)	14 (24.6%)	94 (22.4%)	
Not sure	81 (17.0%)	3 (5.3%)	78 (18.6%)	
Duration of CL wear				
Occasional use	130 (27.3%)	21(36.8%)	109 (26.0%)	0.027*
Few weeks	38 (8.00%)	2 (3.5%)	36 (8.6%)	
Less than 1 year	175 (36.8%)	15(26.3%)	160 (38.2%)	
1-2 years	106 (22.3%)	12(21.1%)	94 (22.4%)	
3-5 years	19 (4.00%)	6 (10.5%)^	13 (3.1%)^	
More than 5 years	8 (1.70%)	1 (1.8%)	7 (1.7%)	
Knowledge of type of CL worn				
Soft	308 (64.7%)	45 (78.9%)	263 (62.8%)	0.049*
Combination of soft and hard	86 (18.1%)	5 (8.8%)	81 (19.3%)	
I don't know	82 (17.2%)	7 (12.3%)	75 (17.9%)	
Average daily hours of CL wear				
Up to 1 hour	56 (11.8%)	5 (8.8%)	51 (12.2%)	0.648
2-4 hours	98 (20.6%)	9 (15.8%)	98 (20.6%)	
5-8 hours	197 (41.4%)	28 (49.1%)	169 (40.3%)	
More than 8 hours	119 (25.0%)	14 (24.6%)	105 (25.0%)	
As long as my eyes are comfortable	6 (1.3%)	1 (1.2%)	5 (1.8%)	
CLs are brought from:				
Flea / Night market, Pasar Malam	1 (0.20%)	1 (1.8%)^	0 (0%)	0.001*
Optometrist	174 (36.6%)	31 (54.4%)^	143(34.1%)^	
Retail Store	115 (24.2%)	12 (21.1%)	103 (24.6%)	
Online	150 (31.5%)	13 (22.8%)	137 (32.7%)	
Other	36 (7.60%)	0 (0%)	36 (8.6%)^	

** Significance p<0.05; ^ indicates items of significant differences between M and N groups.*

M group reported knowledge about identifying the correct geometry of CL (M=71.92%, N=58.23%; χ^2=3.917, df=1, *p*=.048). Figure 1 shows the comparison between the M and N groups for the accuracy of responses with regard to their knowledge.

Attitude

Attitude was measured using a Likert scale of 1 (low) to 5 (high) in 9 questions on their perception of CLs and the necessity of optimum handling practices. A significantly large number of M group

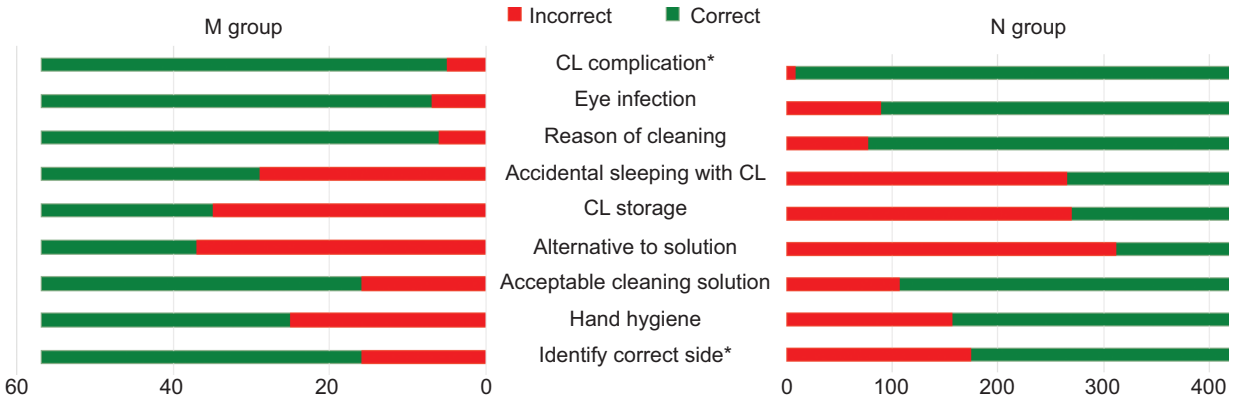

FIGURE 1. Comparison of knowledge towards CL among medical and non-medical groups.

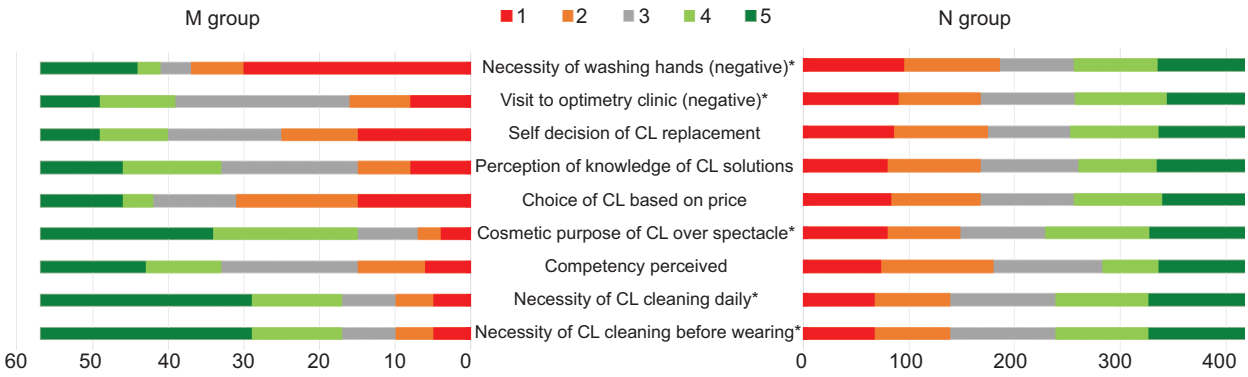

FIGURE 2. Comparison of attitude towards CL wear among the medical and non-medical groups.

students (M=73.68%) appreciated the cosmetic advantage of CL over spectacles as compared to N group students (N=45.35%). Some other items in the attitude section that contributed to significant differences in both groups were visits to the optometry clinic, the necessity of washing hands (both in negative scoring), and cleaning CL daily and before wearing, as shown in Figure 2. Figure 2 shows the comparison between the M and N groups for the accuracy of responses with regards to their attitude

Practice

CL wearing modality in both groups was significantly different (χ^2=16.447, df=4, p=.002), the major difference observed in Biweekly disposables preferred by the non-medical group (M=8.8% Vs. N=21.2%) and monthly disposables preferred by M group (M=59.6% Vs. N=35.6%). Both groups reported similar practices for the use of CL in swimming, including wearing goggles while in water. In both groups, nearly 85% of respondents reported removal of CL while sleeping, and 91% didn't indulge in sharing CL. Figure 3 compares the M and N groups' practice towards CL cleaning, handling, and storage. The N group was better than the M group in cleaning their hands before wearing CL. Surprisingly, among the M group, 2 of 57 responded that they don't necessarily wash their hands before handling CL. Figure 4 compares CL practices in the M and N groups.

With increasing scores of K, A, and P, the risk of CL complications is reduced. Experience of complications was found to be similar between both groups. About 60% of wearers in both groups

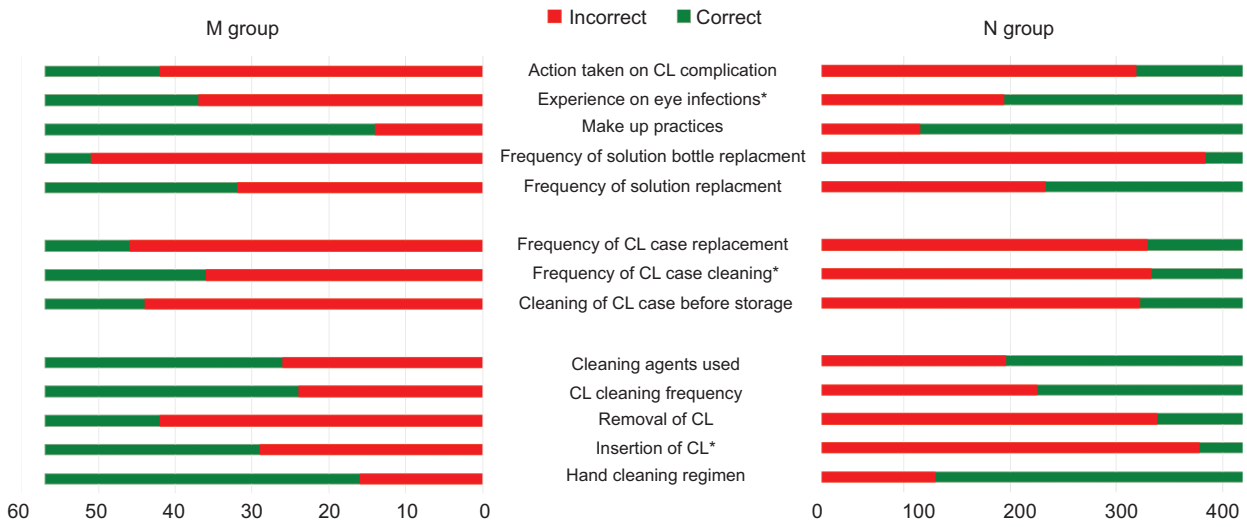

FIGURE 3. Comparison of practice towards CL cleaning, handling, and storage among medical and non-medical groups.

FIGURE 4. Comparison of practice towards CL between medical and non-medical group.

reported experiencing at least one complication during their wearing period, as shown in the figure below. Dry eye was reported to be the majority of respondents in both groups. Figure 5 compares frequently reported complications between M and N groups.

Role of Practitioner

The role of the eye care practitioner in ensuring good levels of knowledge, practices, and attitude is crucial in maintaining the ocular health of the CL wearer. For instance, demonstrating good CL practice is an important step in dispensing CLs. Considering the online purchase of CL by 31.5% of respondents, the reporting of the CL demonstration was expected to be low. Among the M group, who reported 22.8% purchased from online sources, only 49.1% received a demonstration, 35.1% did not receive, and 15.8% do not remember about a demonstration by a CL practitioner. On the other side, the N group showed significantly different ($p<0.05$) responses, with 32.7% of online purchases, only 33.7% receiving demonstrations, 35.6% did not, and 30.8% don't remember about demonstrations. Follow-up visits ensure healthy practices are being followed by CL users and potentially early detect

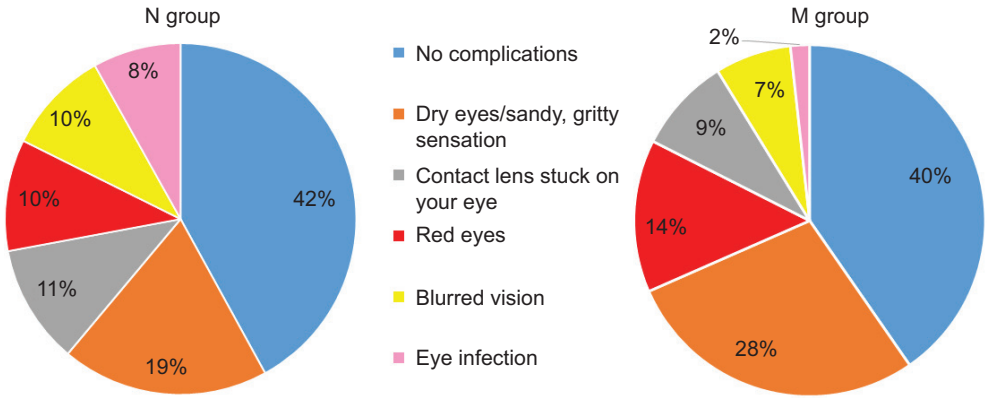

FIGURE 5. Comparison of complications experienced by medical and non-medical groups.

malpractices of CL wear and care. Scheduling of follow-up visits was observed significantly lower in the M group (M=26.31%, N=40.33%, $p<0.05$). However, very few respondents reported completion of follow-up visits in both groups (M=8.77%, N=14.31%, $p>0.05$). When asked about tools to remember handling instructions, 315 out of 476 (66.2%) felt the necessity of a CL user guide. The choice of format for the CL guide was significantly different in both groups ($p<0.05$). Predominant choices were downloadable video (M=40.4%, N=40.6%), audio file (M=12.3%, N=27.0%) and printed material (M=45.61%, N=31.74%).

Overall Comparison of Knowledge, Attitude, and Practices among Medical and Non-medical Users

To further analyze the level of K, A, and P towards CL usage, the answers were scored "1" point for correct and "0" point for incorrect response. These scores were obtained for both groups, and each heading was compared. The data of K, A, and P scores were not normally distributed (evaluated by the Shapiro-Wilk test), so the Mann-Whitney U test (two-tailed) was used. It was observed that there was no statistically significant difference in knowledge scores between medical and non-medical student groups (U=10370, z=–1.645, p = .100). Interestingly, a statistically significant difference was found in the attitude scores (U=9268, z=–2.751, p=.006) and practice scores (U=8770, z=–3.318, p=.001) between the two study groups.

Furthermore, Spearman's correlation was calculated to find if there is a relationship between the K, A, and P scores of CL users. The results are summarized in Table 3. For all the respondents, a weak correlation was obtained between knowledge and practice (r=0.137, $p<.05$). This was a result of a fair to strong correlation of medical respondents (r=0.465, $p<.05$). For the non-medical group, a statistically significant weak correlation was found between attitude and practice (r=0.137, $p<.05$).

DISCUSSION

The increasing prevalence of myopia and the benefits of CLs have increased its popularity and demand across the world. However, there is an increase in CL complications at the same time.[21] In the present study, the prevalence of CL usage among university students was found to be 46%, similar to the previous studies published between 2014 and 2018, ranging from 40.2% to 44.8%.[2,7] Studies have also reported that the prevalence of CL wearers among medical students ranged from 14.0% to 38.0% and was similar to the present study, 39% in medical students[2,12,14,22,23] Interestingly, the prevalence of CL wearers in the non-medical student group was higher (46.8%). About half of CL users in this survey were new users with a history

TABLE 3 Comparison of Spearman's Correlation (r) between Knowledge (K), Attitude (A) and Practices (P) among M and N Groups.

Parameter	All respondents (n=476)		Non-medical respondents (n=419)		Medical respondents (n=57)	
	r	p	r	p	r	p
K and A	0.031	0.507	0.004	0.929	0.097	0.474
K and P	0.137	0.003*	0.083	0.090	0.465	<0.05*
A and P	0.110	0.016*	0.110	0.025*	–0.025	0.856

** Significance p<0.05.*

of CL usage of less than a year. Therefore, this marginal increase in the prevalence of CL users warrants a detailed understanding of the K, A, and P of these new users, especially university students with varied academic backgrounds. Many studies have shown deficiencies in K, A, and P of CL usage in different communities and age groups.[12,14,15,19,22,24] However, the leverage provided by the patient's educational background is rarely studied. This study adds value for CL practitioners in understanding CL usage patterns by comparing CL users' K, A, and P scores with medical and non-medical academic backgrounds.

The survey recorded a significantly higher number of young users (58% between 18-23 years) and female (55%) respondents. Yet, cosmetic purpose CL usage was reported 28.1% in the M group and 20.5% in the N group. This was observed as a lower proportion than previous studies published in 2018, which reported over 56% of users wearing for cosmetic reasons.[25,26] These differences could be attributed to cultural differences, region of stay, increasing proportion of Gen Z users, academic orientation of respondents, and survey conditions.[27] No significant difference was seen in reasons for CL usage, with the majority opting for CL for vision correction. Additionally, the M group was more thoughtful when selecting a source to buy CLs. It was aware of CLs as medical equipment needing professional advice, adequate care, and compliance.[2] Just about one-third of the respondents reported receipt of demonstration and training for CL handling. This was a consequence of N group Gen Z buyers predominantly shopping from online sources, where logistic partners delivered the products, and hence, no instructions and training for safe usage of CL was warranted.

Knowledge

The study's findings highlight that both groups had a moderate knowledge of CL usage. It is critical to have good knowledge about CL wearing modality, hand hygiene, and CL handling for healthy long-term CL wear. CL practitioner is responsible for educating the CL wearer every time a pair of lenses is dispensed. It is important to re-emphasize the knowledge about the types of CLs and solutions, modes of CL usage, hand hygiene, CL storage, and complications associated with non-compliance.[12,28] The M group was expected to know more about general health and hygiene than the N group. However, both groups showed a similar comprehension of CL types, hygiene, storage, solutions, and even complications that may occur with the overuse of CLs. Therefore, CL practitioners must focus on patient education, irrespective of the patient's educational background.

CL overuse is common nowadays due to convenient access to high-quality lenses, but it could still end up causing serious eye complications like a corneal ulcer, giant papillary conjunctivitis, and CL-associated red eye.[11] A study conducted among young adults in the year 2020 found that the participants did not have adequate knowledge; however,

the educational level of these participants was not reported.[19] Another study in Malaysia reported that almost half of the respondents from rural areas lack knowledge of the risks associated with CL usage.[29] It is rational to expect that university-going students must have adequate knowledge regarding CL wear and be able to seek medical treatment promptly.[5,14] However, nearly half of the respondents in the M group in this study could not respond with correct answers to many questions in the knowledge section. This is alarming, and therefore, CL practitioners must focus on delivering adequate knowledge while dispensing CL to their patients, irrespective of their academic and cultural background or environment.

Attitude

While knowledge can be imparted, attitude is more deeply embedded and considerably impacts CL practice.[30] In the present study, an evident difference was found in attitude between both study groups. Most of the N group participants scored less than 16 out of 25 in the attitude section, which is worrisome. Hence, we recommend that CL practitioners must devote significant chair time to counselling young users, especially non-medical students, to develop the right attitude for the healthy practice of CL wear. A good attitude about hand hygiene is essential to prevent high instances of failure to comply with CL cleaning practices.[31] Following that, aftercare appointments are crucial for healthy eyes, preserving vision, and getting timely treatment for CL-related complications if required.[19] Little more than one-third of users reported fixing an appointment, and about one-tenth reported completion of follow-up visits in both groups. CL practitioners must proactively take measures to improve these numbers. The findings of this study also suggest that about half of respondents chose CLs based on their price and decided to replace CLs on their own. CL practitioners need to support good decision-making by highlighting clinical factors to ensure healthy practices while respecting patient-centric care in their CL practice.

Practice

This study showed significant differences in CL wear and care practices in both groups. However, most respondents in both groups showed incorrect practice patterns concerning CL storage, cleaning of storage cases, and replacing solution bottles and cases. Earlier studies in 2011[32] (n= 645 and 787 and 2013[33] reported similar findings. Nonetheless, both groups showed similar, moderate to high levels of acceptable practice in CL handling, wearing schedule, and non-sharing of CL. Following the right wearing schedule is crucial to minimize the risk of CL-related complications.[24,34] This study also found that more than half the respondents (58.2%) had experienced some CL-related complications during their CL usage. CL users and practitioners often pay good attention to timely replacement of lenses. However, the schedule's importance for replacing the solution bottle and storage case cannot be turned down. CL practitioners may dispense extra pairs of storage cases and small-size solution bottles while dispensing CLs and instruct patients to adhere to their replacement schedule strictly. The results of this study re-emphasize the need for careful checks of storage cases and solution bottles during every follow-up visit. The results also warrant the importance of scheduling and completing follow-up visits without differentiating CL users on their medical or non-medical background. Eye care practitioners may also consider providing downloadable videos as the preferred format of instructional guides to all CL users.

On investigating the relation between the scores for K, A, and P, we found a weak positive correlation between knowledge and practice, influenced by the scores of M group respondents. Therefore, we postulate that even if the user has adequate knowledge, it may not be applied in practice. On the other hand, there was also a weak correlation between attitudes and practices in the study population, influenced by N group respondents. Therefore, while dispensing CL, especially to young users, CL practitioners must pay attention to the purpose and attitude of CL users.

We recognize the limitations of the study. The findings of this study are based on subjective

patient-reported responses, which may sometimes be influenced by deceit, yet there is sufficient reason for CL practitioners to be concerned about the attitudes and practices of CL users. Although the M group was slightly better in the practice of CL than the N group, many needed to be more compliant with the instructions given and had experienced a few complications. Education about CL care and related complications is therefore inevitable for all CL users. This study compared the groups based on their academic background. However, the knowledge and skills are expected to advance with increasing experience in CL wear. Therefore, future studies may consider the number of years of CL experience to conclude K, A, and P of CL users.

CONCLUSION

The results of this survey disrupted the presumption that CL users with medical backgrounds possess better K, A, and P toward CL usage. Respondents with and without healthcare and medical knowledge showed deficient knowledge, attitude, and practice levels among young CL users. To minimize complications and enjoy long-term healthy CL usage, the users, irrespective of their educational background, must gain sufficient knowledge, nurture correct attitudes, and develop healthy practices in CLs. Equal responsibility lies with the CL practitioners, who need to become more proactive and uplift their efforts in ensuring appropriate training, counselling, and building of healthy habits of care and maintenance while promoting their CL practice. This will help the CL industry overcome growth challenges, providing safe opportunities for vision correction to the increasingly prevalent myopic population at large.

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APPENDIX I

Survey to understand the Knowledge, Attitude, and Practices towards contact lens usage amongst university students.

Information for respondents: The research is to study about the knowledge, attitude, and practice of contact lenses wearers among University Students. This questionnaire consists of 8 sections and takes up to 10-15 minutes to fill up all the questions.

- Section 1 to provide information regarding your demographic details.
- Section 2 to provide information regarding your knowledge level related to contact lenses and their solutions.
- Section 3 to provide information regarding your attitudes towards contact lens wear and care.
- Section 4 to provide information regarding your practices related to contact lens wear and care.

We assure you that all answers provided by you will be kept PRIVATE and CONFIDENTIAL and to be used solely for academic & research purposes only.
Thank you for your willingness to participate in this survey. We truly appreciate your time and cooperation.

Consent from for Respondents:
Please choose one option to proceed.

☐ I agree to participate in this survey. [Proceed to section 1]
☐ I disagree with participating in this survey. [Proceed to section 9]

Section 1 – Demographics

1. Gender
   ☐ Male
   ☐ Female
   ☐ Do not wish to disclose.
2. Age
   ☐ 17 or below
   ☐ 18 – 23
   ☐ 24 – 29
   ☐ 30 – 35
   ☐ 36 or above
3. Which faculty are you currently studying.
   ☐ Faculty of Business & Accounting
   ☐ Faculty of Dentistry
   ☐ Faculty of Early Childhood Care & Education
   ☐ Faculty of Engineering & The Built Environment
   ☐ Faculty of Law Faculty of Medicine
   ☐ Faculty of Optometry & Vision Sciences [Proceed to section 9]
   ☐ Faculty of Pharmacy
   ☐ Faculty of Technology & Innovation
   ☐ Pre-University/Foundation
   ☐ Others: (please specify) _____
4. Have you ever worn contact lenses.
   ☐ Yes
   ☐ No

Section 2 – Knowledge

Please choose one option for each question below. All questions are mandatory.

1. Why do you wear contact lenses?
   ☐ Vision correction
   ☐ Cosmetic reason
   ☐ Due to surgery or ocular disease
   ☐ Both vision correction and cosmetic reasons
   ☐ Not sure.

2. Which type of contact lenses do you wear?
   ☐ Soft
   ☐ Rigid (Hard)
   ☐ Scleral
   ☐ Combination of hard and soft
   ☐ I don't know.
3. When cleaning your contact lenses:
   ☐ I just rinse in saline and store in contact lens solution.
   ☐ It is important to rub the lenses slightly to loosen only deposits.
   ☐ It is important to rub the lenses to loosen the bacteria.
   ☐ It is not important to rub the lenses as I use multipurpose solution.
   ☐ I just have to rinse and store in the disinfection solution as it is multi-purpose.
4. Has your optometrist demonstrated the insertion of contact lenses?
   ☐ Yes
   ☐ No
   ☐ I don't remember,
5. Do you know what is the brand name of your contact lenses?
   If yes please state your contact lens brand name, If no just type in N/A_____
   _____
6. Why do you think it is necessary to clean your contact lenses?
   ☐ So, I don't get any infections.
   ☐ To remove any debris on my lenses
   ☐ I don't think it's necessary to clean my contact lenses.
   ☐ To allow me to see better through them.
   ☐ I don't know.
7. How often do you replace your lenses?
   ☐ Daily
   ☐ Twice a month
   ☐ Monthly
   ☐ Only when I cannot see clearly anymore
   ☐ Once a year
8. When a contact lens is on right side up
   ☐ It appears as a bowl shaped with the edges straight up.
   ☐ Appears V-shaped with edges curling outwards.
   ☐ The lens can be used with either side up i.e. it is reversible.
   ☐ It does not matter if it is on the right or wrong side as you will still see well.
   ☐ I dont' know.
9. What is the minimum hand hygiene with respect to before you handle contact lenses?
   ☐ Wiping your hands with a dry towel
   ☐ Washing your hands with water
   ☐ Washing your hands with soap and water
   ☐ Cleaning your hands with hands sanitizer
   ☐ I don't know what's hand hygiene
10. Which of the following are acceptable contact lens solutions?
    ☐ Multipurpose solution (MPS)
    ☐ Saline
    ☐ Water
    ☐ Peroxide
11. It is best to store contact lenses.
    ☐ Dry, without solution
    ☐ In disinfecting solution
    ☐ In saline
    ☐ In water
    ☐ In any liquid
12. Do you know what is the brand name of your contact lens solution?
    If yes please state your contact lens brand name, If no just type in N/A
    _____
13. Which of the following fluids can be used if you don't have access to contact lens solution?
    ☐ Tap water.
    ☐ Boiled water

☐ Saliva
☐ Urine
☐ None of them

14. What can cause or lead to contact lens complications?
☐ Infected Lenses
☐ Over wearing the lenses
☐ A torn lens
15. What could be a sign or symptom of a possible contact lens complication?
☐ Itching
☐ Discharge
☐ Pain
16. Overuse of your contact lenses can cause:
☐ Swelling of the lids and cornea
☐ New "Neo" vessels to start growing.
☐ Decreased vision
17. Which of the following are possible complications of contact lens non-compliance?
☐ Corneal ulcers
☐ Allergic conjunctivitis
☐ Cataracts
18. The possible organisms that can cause eye infections in contact lens wearers are:
☐ H1N1 Virus
☐ HIV
☐ Pseudomonas
19. If I happen to fall asleep with contact lens on, upon awakening I should:
☐ Continue wearing the lens as long as it is still comfortable.
☐ Immediately remove it
☐ make sure it is moving in my eyes before removing it.

Section 3 – Attitude

Please read the statement carefully and indicate your degree of agreement with it by clicking the appropriate scale given below.

No	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Cleaning my contact lenses before wearing them is absolutely necessary					
2.	Cleaning my contact lens case daily is necessary					
3.	Washing your hands before handling contact lens is not always necessary					
4.	I am a competent contact lens wearer					
5.	Going for regular contact lens follow-up visit to the optometrist should be optional					
6.	Contact lenses have been designed primarily to rid you of spectacles and make you look good					
7.	I decide when to replace to my contact lenses based on how they feel on my eye and not necessarily on the wearing schedule					
8.	The choice of contact lens solution should be based on what I can afford and not what is best for safe wear					
9.	I am knowledgeable about contact lens solutions					

Section 3 – Practice

Please choose one option for each question below. All questions are mandatory.

1. How long have you been wearing contact lenses for?
   - ☐ Occasional use
   - ☐ Few weeks
   - ☐ Less than 1 year
   - ☐ 1-2 years
   - ☐ 3-5 years
   - ☐ More than 5 years
2. Where do you buy your contact lenses from?
   - ☐ Optometrist
   - ☐ Retail store
   - ☐ Online
   - ☐ Flea market/Night market/Pasar Malam
   - ☐ Others. Please Specify: _____
3. Which type of contact lens wearing schedule do you follow?
   - ☐ Daily disposables
   - ☐ Biweekly disposables
   - ☐ Monthly disposables
   - ☐ Conventional Daily wear
   - ☐ Extended wear
4. How many hours a day do you use your contact lens for?
   - ☐ Up to 1 hour
   - ☐ 2-4 hours
   - ☐ 5.8 hours
   - ☐ More than 8 hours
   - ☐ For as long as my eyes feel comfortable
5. Do you clean your hands thoroughly before inserting and cleaning contact lenses?
   - ☐ Yes
   - ☐ No
   - ☐ Sometimes
6. How do you clean your hands?
   - ☐ Water
   - ☐ Water and soap
   - ☐ Hand sanitizer
   - ☐ Wipe with the towel
   - ☐ I do not clean my hands.
7. How do you insert your contact lenses?
   - ☐ Remove from solution and insert the contact lens in my eye.
   - ☐ Remove lens from solution, disinfect the lens, verify that the lens is the right side up and then insert.
   - ☐ Ask a friend/family member to insert the lens for me.
8. Do you shower while wearing your contact lenses?
   - ☐ Yes
   - ☐ No
   - ☐ Sometimes
9. Do you wear contact lens to swim?
   - ☐ Yes
   - ☐ No
   - ☐ Sometimes
   - ☐ I don't swim.
10. Do you wear contact lens and goggles to swim?
    - ☐ Yes
    - ☐ No
    - ☐ Sometimes
11. How do you remove your contact lenses?
    - ☐ Pinch it out from over the colored portion of my eye.
    - ☐ Ask a friend or family member to remove it.
    - ☐ Hold eyelids with two fingers in front of mirror and then remove the lens.
    - ☐ Pull the lens down onto the white portion of my eye and then pinch it out.
    - ☐ Whatever feels comfortable.
12. Do you sleep with your contact lenses?
    - ☐ Yes
    - ☐ No
    - ☐ Sometimes
13. Do you ever share your contact lenses with any one?
    - ☐ Yes
    - ☐ No
    - ☐ Sometimes

14. Do you clean your contact lens adhering strictly to the instruction of optometrist/ optician?
    ☐ Yes
    ☐ No
    ☐ Sometimes
15. How often do you clean your lenses?
    ☐ Everyday
    ☐ Every 2-4 days
    ☐ Every week
    ☐ Every month
    ☐ I never clean them.
16. What do you use to clean your lenses?
    ☐ Water
    ☐ Saliva
    ☐ Saline
    ☐ Peroxide
    ☐ MPS
17. How often do you replace your contact lens solution in your storage case?
    ☐ Everyday
    ☐ Every 2-4 days
    ☐ Every week
    ☐ When my solution dries up
    ☐ Never
18. How do you clean your contact lens case?
    ☐ Rinse with warm water and leave to air dry.
    ☐ Rinse and rub with warm water and leave to air dry.
    ☐ Wipe with cloth or tissue
    ☐ Rinse with dis-infective solution.
    ☐ Rinse and rub with dis-infective solution.
19. With respect to the application and removal of make-up:
    ☐ Apply after inserting contact lens and remove after removal of contact lens.
    ☐ Apply before inserting contact lens and remove after removing contact lens.
    ☐ Apply after inserting contact lens and remove before removing contact lens.
    ☐ Apply before inserting and remove before removing contact lens.
    ☐ It doesn't really matter.
20. How often do you replace the bottle of the cleaning solution?
    ☐ Every month
    ☐ Every few months
    ☐ Until It get finished
    ☐ Until it expires
21. Do you use your contact lens solution past the expiry date?
    ☐ Yes
    ☐ No
    ☐ Sometimes
22. How often do you replace your contact lens case?
    ☐ Monthly
    ☐ Every 3 months
    ☐ Every 6 months
    ☐ Once a year
    ☐ Never
23. How often do you clean your lens case?
    ☐ Daily
    ☐ Every few days
    ☐ Once a eek
    ☐ Once a month
    ☐ I never clean my lens case.
24. Have you ever had an eye infection since you started wearing contact lenses?
    ☐ Yes
    ☐ No
25. Have you ever experienced any of the following eye complications due to contact lens wear?
    ☐ Dry eyes/sandy, gritty sensation
    ☐ Red eyes Blurred vision
    ☐ Contact lens stuck on your eye.
    ☐ Eye infection
    ☐ None of above
26. Do you continue to use your contact lens if you experience any of the above symptoms?
    ☐ Yes
    ☐ No
    ☐ Sometimes

27. What do you do when you experience these symptoms?
    - ☐ Stop contact lens wear and seek advice from optometrist.
    - ☐ Stop contact lens wear until sign and symptoms go away then continue wearing the contact lens.
    - ☐ Put eye drops that a pharmacist recommended.
    - ☐ I do nothing and I continue to wear contact lenses.
    - ☐ See my general practitioner.
28. Has your optometrist/optician scheduled aftercare visits with you to assess adaptation and fit of contact lens?
    - ☐ Yes
    - ☐ No
    - ☐ I don't remember.
29. Have you followed up with the scheduled aftercare visits?
    - ☐ Yes
    - ☐ No
    - ☐ Sometimes
30. Who is the person who has advised you on all of the above contact lens knowledge and practices?
    - ☐ Optometrist
    - ☐ Receptionist
    - ☐ Shop keeper
    - ☐ Vendor at flea market.
    - ☐ Instruction book that came with my contact lenses when I ordered them online.
    - ☐ Optician