Asian Journal of Medicine and Health Sciences Vol 5 Issue 1 June 2022

ORIGINAL ARTICLE

Assessing the Knowledge on Safety Handling of Contact Lens among Students, Cyberjaya, Selangor, Malaysia.

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Abstract

Introduction: Contact lenses have been used for refractive error correction or cosmetic purposes and have been increasingly popular worldwide. However, careless contact lens use poses a risk of developing complications like polymicrobial keratitis, contact lens related corneal ulcer, acanthamoeba keratitis and dry eyes.
Method: Utilizing an online questionnaire, a cross-sectional study was conducted among 182 University of Cyberjaya (UOC) students to determine their knowledge level, their compliance rate concerning the proper handling of contact lenses and the association between them. The questionnaire used was a self-explained structured set of questions which was pretested and revised by two ophthalmologists in the Faculty of Medicine.
Results: Participating in the survey were 75% female and 25% male; 57% of participants had unsatisfactory knowledge, with no significant difference in knowledge between contact lens wearers and non-wearers. Only 37% of those who were compliant had satisfactory knowledge and there was no association between knowledge and compliance among contact lens wearers.
Conclusion: In this study found there was no significant association between knowledge and compliance to proper contact lens handling among contact lens wearers. Therefore, it is recommended an awareness program be conducted to promote healthy contact lens care and wear among students.

Keywords: Contact lens, Compliance, Knowledge, Non-contact lens wearers, University students.

Introduction

Contact lenses have become more and more in demand not only due to their refractive correcting error property but also for cosmetic reasons, they vary in terms of type and material and the rapid evolution of the contact lens is jeopardized by the complications in handling contact lenses. Among the various types of contact lenses, soft contact lenses are the most used for refractive correction worldwide. As far as contact lens usage for correcting refractive error is concerned, the complications that come with wearing contact lenses are a significant part in ophthalmic practice.

Besides wearing CLs (contact lens) for therapeutic reasons, CL worn for aesthetic reasons have been rapidly growing in the CL wearing population in Asian countries such as Malaysia, Singapore, China, Hong Kong, Taiwan and Korea. Industry led surveys have revealed that up to 88 per cent of women surveyed are interested in changing the colour of their eyes with coloured contact lenses.[1]

Ocular complications can be affected by a multitude of reasons, including care systems, CL material, durability, lens rotting characteristics, wear schedule, and patient-related issues. Poor handling and lens case hygiene are two identified predisposing variables that are routinely targeted to ensure safer lens usage.[2] However, the severity and frequencies of complications have a range depending on mechanisms such as trauma caused to the conjunctiva and cornea, acute and chronic hypoxia which comes from prolonged decrease in transmissibility to oxygen. Allergic reactions are also among the mechanisms that can cause further complication to the contact lens wearers due to protein deposits in the CL.[3] Corneal ulcer is among the most common complications due to improper lens wear and lack of awareness of aftercare hygiene. 202 patients were notified of the CLRCU (contact lens-related corneal ulcer) registry in 2007-2008, with an average age of 26.7 years (71.8 per cent female). All registered patients wore soft contact lenses, with monthly disposable lenses being the most popular (83.5 per cent). The proportion of respondents who had bacterial CLRCU, with *Pseudomonas sp.* being the most common causative organism (79.7 per cent of bacterial cases) .[4] Proper handling of contact lenses can prevent complications such as Acanthamoeba keratitis and dry eye syndrome. According to a study done in Brazil, contact lens wear showed to be a potential predisposing factor for Acanthamoeba keratitis.[5] It has been established that CL materials with low oxygen permeability where oxygen tension at the tear film is decreased are more likely to induce corneal oedema.[6]

It is important that the knowledge of contact lens is assessed because in a way it can reflect the awareness on CL complications, however, the correlation between awareness and practice is lacking and this is reflected in a study done in Thailand where medical students did show better result in knowing the different complications that arise with improper handling of contact lens compared to non-medical students, however, on the behavioural component of the questionnaire results were similar between medical and non-medical student in which they did practice the common improper technique of handling contact lens.[1] Hence, further investigation on factors that affect compliance despite awareness would give minimum complications with maximum successful CL wear. In a study done there was no association between gender and education level on the compliance of contact lens care but there was an association between income and compliance of wearers to rinse their lens case. It was found out that only 29% were advised by prescribers on how often they should come for contact lens check-up which might be why compliance is low.[7] Another study conducted among medical students at the University of Malaya in 2008 concluded that knowledge of contact lens usage alone might not ensure proper contact lens wear and care, and that lack of proper practise, even among educated and

knowledgeable users such as medical students, may increase the risk of contact lens-related complications.[8]

As a result, it is necessary to examine contact lens wearer's knowledge and practise in order to reduce contact lens-related complications and promote ocular health. It is also crucial to assess the knowledge of individuals who have yet to wear contact lenses so that they are more informed and practise better handling of contact lenses.

In this study, the authors aimed to assess knowledge, attitude, and practice towards contact lenses among University of Cyberjaya (UOC) students. Then, to assess compliance toward proper handling of contact lens among contact lens wearers and correlation between knowledge and compliance among contact lens wearers.

Materials and methods

A cross sectional study was conducted using a structured questionnaire among students from University of Cyberjaya (UOC). A convenient sampling method was used to sample the population after referring to a study done by Tajunisah (2008), where their sample size was 102.[9]

A questionnaire consisted of three sections in which the first section was for sociodemographic data, the second section was to assess knowledge in both contact lens wearers and non-contact lens wearers as adapted from study done by Giri.[10] and the third section was to assess practice and compliance among contact lens wearers adopted from study done in SEGi.[8] Students wearing contact lenses or have worn contact lenses before were asked regarding their knowledge and practice of contact lens wear. On the other hand, students that have never worn contact lenses were only asked regarding their knowledge of contact lens wear. The knowledge section consists of five questions.

The questions used to assess knowledge were:

- Which of the following are risks when wearing contact lenses?
- Contact lens limit the oxygen entering the cornea (transparent outer layer of the front of the eye covering the pupil and iris)
- Can you sleep with a contact lens on?
- Do contact lenses have expiry dates?
- Between disposable contact lens and extended wear contact lens, which is safer?

Each question answered correctly in the knowledge section consist of one score, the maximum score for knowledge is five. The question on risk when wearing contact lens include red eyes, dry eyes, and infection where one point was given to those who ticked all three options and zero points if not otherwise. Scoring five out of five is defined as satisfactory knowledge, whereas a score below five is defined as unsatisfactory knowledge.

Compliance was assessed in a scoring manner where if all seven questions were answered with a Yes, the respondent is compliant. If out of all 7 questions, one were to be answered as No, then, respondent is considered non-compliant.[8]

The questions used to determine compliance were:

- Do you dispose of the contact lens after its expiry date?
- Do you remove your lens before going to sleep?
- Do you wash your hands before handling the contact lens?
- Do you wash your lens?
- Do you use lens solutions as cleaning material?
- Do you clean your contact lens case?
- Do you change the contact lens case?

The questionnaire was prepared in English and participants with eye conditions that include keratoconus, dry eyes, allergy conjunctivitis, immunosuppressed and those with diabetic neuropathy were excluded from this study. A pilot study was done a week prior, on 20 students from university of Cyberjaya, and adjustments

were made for better comprehension of the components.

Finally, Pearson chi square test was utilized to find any association between knowledge and compliance between contact lens wearers with the significant level was set at 0.05. Statistical Package for the Social Sciences (SPSS) version 20 was used to collect and analyse data that was compiled.

Ethical approval has been granted by University of Cyberjaya research ethics review committee with reference number CUCMS/CRERC/AL-ER (32/2019)

Results

From the 182 participants, 75% were female respondents and 25% were male respondents. Among all the participants, 34% were contact lens wearers (n=61) in which 85% were female contact lens wearers and 15% male contact lens wearers. There were 73% Malay, 12% of other ethnicities, 9% Indian and 6% Chinese respondents.

54% of the participants wore contact lenses for refractive error correction and cosmetic purposes. Majority of the participants wore contact lenses which were purchased in spectacle shops (85%), 12% purchased their contact lenses online and 3% purchased them from beauty product shops (Table 1).

Among all participants, 43% were categorized had satisfactory knowledge whereas 57% had unsatisfactory knowledge (Table 2).

The question which had the highest percentage of wrong answers (41%), was on the risk when wearing contact lenses. Majority of the participants answered the following questions correctly; whether contact lenses limit the entry of oxygen into the eye (75%), whether you can sleep with contact lenses (95%), do contact lenses have expiry date (98%) and which contact lenses are safer (92%) (Table 3).

As for contact lens handling, 97% threw away their contact lens according to expiry date, complied to washing their hands prior to handling contact lens (98%), did not share their contact lens (97%), used lens solution (97%) however, 46% of the participants did not replace their contact lens case, 10% did not clean their contact lens case, 10% used tap water to clear their contact lenses and 10% would sleep with their contact lens on. 82% of the participants did not meet a doctor regarding their contact lens. Sixty-four percent of the participants were non-compliant in handling contact lenses.

Pearson Chi-squared test was used to assess the association between knowledge and compliance among contact lens wearers. There was no significant association between knowledge and compliance among contact lens wearers with a P-value of 0.888 (Table 4). 63% of those with satisfactory knowledge were non-compliant. The compliance was low in students with satisfactory knowledge or not.

Discussion

The prevalence of contact lens wear in this study was 34%. There was no data available on the prevalence of contact lens use in Malaysia's general population. However, a study from Nigeria has reported a similar prevalence of contact lenses, with 40% of the sample population wearing them. The majority of contact lens wearers in this study were females (75%) which is consistent with a study done by Bhandari (74%).[7,8]

This study also assesses the knowledge of UOC's students' not wearing contact lenses. This is because their knowledge heavily influences an individual's health behaviour. As a result, health education is an effective tool for promoting good health.[3]

Both groups showed a similar prevalence of unsatisfactory knowledge in contact lens usage with 56% of contact lens wearers and 58% of non-contact lens wearers having unsatisfactory knowledge. This unexpected finding is worrying because those at risk of developing contact lens related complications are not more informed than their counterpart. This is important because

complications related to contact lens wear are devastating and can even lead to blindness. Individuals who are wearing contact lenses should have satisfactory knowledge as the complications related to contact lens wear are very much preventable.

The aforementioned contact lens-related complications come in a spectrum of benign eye conditions such as eye discomfort and, more commonly, eye dryness, to more severe complications such as microbial keratitis that if left untreated, it might lead to eyesight loss.[11] In tertiary hospital in India, reported a prevalence of 21% contact lens-related complications, including papillary conjunctivitis, superficial punctate keratitis, and corneal neovascularization, whereas infective keratitis, epithelial pathology and allergic conjunctivitis were the most common in a Singapore public hospital.[12] The use of contact lenses raises the chance of acquiring microbial keratitis by 80 times, wherein bacteria cause 90% of microbial keratitis, and risk factors for its development include extended wear, soft contact lenses, and mechanical factors. The remaining 10% was due to Acanthamoeba keratitis, with water contamination in contact lens care being a key risk factor.[13] Another common complication is superficial punctate keratitis, reported at 36% by a study done in a tertiary hospital in China.[14] Structurally under slit-lamp examination, superficial punctate keratitis and microbial keratitis appear similar; hence close monitoring through follow-ups is required as SPK are self-limiting, whereas microbial keratitis would require broad-spectrum antibiotics.[11] The compliance rate found in this study is higher (36%), compared to a study done by SEGi which had only 28% compliance rate.[15] We also found that 97% participants disposed of their lenses according to its expiry date and this is higher in comparison to a study done by Karnataka which had 57%.[3] Besides that, this study showed to have a slightly higher percentage (90%) of participants who removed their contact lenses before sleeping than what was reported by Tajunisah in 2008 (87%). In this study, 98% washed their hands before handling contact lenses which is higher compared to 91% of a study done by Tajunisah.[9] This study shows a higher percentage (54%) of contact lens wearers who replaced their contact lens case compared to 7.6%, as report by Leeamornsiri.[1] Finally, 97% used lens solutions when cleaning their contact lens and 90% cleaned their lens case. A similar study done among female college students in Saudi Arabia showed only 74% of participants immerse the lens in cleaning solution and 82% cleans the lens case regularly.[16]

Nevertheless, there were certain aspect that this study population had lower compliance rate when compared to other studies such as,10% admitted having washed their contact lenses with tap water. This is lower compared to a study done by Purushottam, where 21% were using self-prepared solutions i.e., boiled water/ tap water to clean their contact lenses.18% of contact lens wearers visit a doctor regarding their contact lenses annually which was very low compared to a study done by Twintech University [7] in which 69% of participants had visited their doctor regarding contact lenses within a year. Regular follow up is very important in preventing development of contact lens related complications. A retrospective cohort study done in Rafha General Hospital found a significant association between regular follow up and a decrease in incidence of contact lens complications while Sauer et. al.,[17] reported that receiving no information about contact lens care can increase the risk of having microbial keratitis by almost 20-fold.[7,9,16,18]

We found that there was no significant association between knowledge and compliance to contact lens wear. The high number of respondents that did not know about the complications of contact lens wear might contribute to the poor compliance rate as suggested by Tajunisah.[9] In contrast, according to Aldabesi[16], the level of education was associated with cleaning of the lens case (p=0.005), cleaning hands before putting the lens in the lens case (p=0.001), immersing the lens in

cleaning solution (p=0.002), and follow-up visits with the eye care practitioner (p=0.004).[8] Knowledge is important in compliant behaviour, but knowledge alone is insufficient. This suggests that better education alone is not the answer unless there is corresponding attitudinal change and behaviour modification.[16,19]

This study has its limitations. The study did not incorporate other factors that might affect compliance including duration of contact lens wear as a contributing factor to level of knowledge and compliance to proper handling of contact lenses. Finally, we did not explore the reason that people were not compliant to proper handling of contact lenses.

It can be suggested that there needs to be an awareness program aimed at increasing awareness and knowledge regarding contact lens. Further study is also needed to explore the association of compliance with other determining factors such as duration of usage and explore the reason of malpractice so that compliance rate can be improved and subsequently prevent the occurrence of contact lens related complications.

Conclusion

This study found the knowledge and practice towards safety hygiene of contact lens were low among students in this university and there was no difference in knowledge between contact lens and non-contact lens wearers. These findings suggest that frequent intervention programs are needed to improve knowledge, attitude, and compliance regarding safety handling of contact lens among students. Optometrists and general practitioners should educate contact lens wearers to enhance their knowledge and attitude toward contact lens care, considering their usage for either their corrective or aesthetic features. University-based awareness programmes run by well-informed personnel could help both contact lens wearers and non-contact lens wearers improve their understanding.

Conflict of interest

All authors declare no conflict of interest.

Table 1. General sociodemographic data

Sociodemographic data	Frequency	Percentage
Gender		
Male	46	25%
Female	126	75%
Race		
Malay	132	73%
Indian	17	9%
Chinese	11	6%
Other	22	12%
Course		
Bachelor in Medicine and Bachelor in Surgery	136	75%
Bachelor in Pharmacy	11	6%
Bachelor/Diploma in Psychology	7	4%
Bachelor in Homeopathic medical medicine	2	1%
Bachelor's in biomedical engineering and Technology	5	3%
Bachelor/Diploma Occupational Safety and Health	9	5%
Foundational studies	5	3%
Bachelor/ Diploma in Business Administration	0	0%
Bachelor in Physiotherapy	4	2%
Contact lens wear status		
Yes	61	34%
No	121	67%
Purpose of wearing contact lens		
Correcting vision	24	39%
Cosmetic	8	13%
Both	29	48%

Table 2. Knowledge regarding contact lens among all participants

Knowledge	**Contact lens wearers No. (%)**	**Non-contact lens wearers No. (%)**	**Total**
Satisfactory knowledge	26 (43)	52 (43)	78 (43)
Unsatisfactory knowledge	35 (57)	69 (57)	104 (57)
Total	61 (100)	121 (100)	182 (100)

Table 3. Frequency of correct answer for each question on contact lens knowledge among respondents

Knowledge question	Non-contact lens wearer (n=121) No. (%)	Contact lens wearer (n=61) No. (%)	Total (n=182)
Risk of contact lens	71 (59)	36 (59)	107 (59)
Limit entry of O2	88 (73)	49 (80)	137 (75)
Sleep wearing contact lens	118 (98)	55 (90)	173 (95)
Expiry date	117 (97)	61 (100)	178 (98)
Safer option of contact lens	108 (90)	59 (97)	167 (92)

Table 4. Association between knowledge and compliance among contact lens wearers

Knowledge	Compliance, n (%)		Total, No. (%)	P value
	Compliant	Non-compliant		
Satisfactory	10(37)	17(63)	27 (100)	0.888
Unsatisfactory	12(35)	22 (65)	34 (100)	

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