Contact lenses in Saudi Arabia: prevalence and characteristics of wear and care

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Abstract—
Purpose: To assess the prevalence and trends in contact lens (CL) wear in Saudi Arabia.
Method: An online self-administered survey was distributed to Saudi Arabian citizens. The questionnaire was constructed to gather information regarding CL wearer demographics, education level, current job, purpose of wear, wearing habits during the day, sharing of CLs with friends, wearing hygiene, lens case replacement, and attitudes toward aftercare visits.
Results: A total of 10,858 CL wearers completed the questionnaire. Of these 88.8% were females and 11.2% were males. Over 70% of the respondents were aged 16-25 years. The majority of the CL wearers were students (58.4%) and cosmetic was reported as the main reason for CL wear (43.1%) followed by refractive errors (31.3%). Compliance seems to be an issue in the CL wearers, with 21.8% stating they had slept in their CLs, 18.4% had shared CLs with friends, 62.4% had obtained their lenses without prescription and 58.8% stated that they had not visited an eye care practitioner (ECP) for a checkup.
Conclusion: This study represents the first to report the prevalence and characteristics of CL wear in Saudi Arabia. Poor compliance was clear regarding many CL aspects. The results will help health authorities and ECP in planning better CL services, and better regulations need to be applied to regulate safe CL sale and wear in Saudi Arabia.

Keywords: contact lenses, prevalence, compliance, survey, Saudi Arabia, eye care practitioner**.**

1 INTRODUCTION

It has been estimated that the number of CL wearers exceeds 140 million worldwide [1]. In the United States, the number of contact lens wearers is estimated to be 40.9 million according to a population-based survey [2]. In the United Kingdom, the number of CL wearers has risen from 1.6 million in 1992 to 3.5 million in 2014 then to 3.7 million in 2016 [3]. However, it is often suggested that many CL wearers exhibit poor compliance, or lack awareness of lens hygiene or the importance of aftercare visits to their eye care practitioners (ECPs).

In Saudi Arabia, there are no clear numbers for CL wearers, as most studies have concentrated on CL complications rather than exploring the CLs prevalence or compliance among the Saudi Arabian community [4-7]. The few studies that have been conducted on CL wear and care are either outdated or limited to a certain group of subjects [8-12]. In 2014 a study, with a sample size of 1,466 participants, showed interesting findings about CLs prevalence and care in the Saudi community [8], however, it was limited to female university students.

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There are many CL complications directly associated with the level of compliance with CL wear and care, which may start from feeling discomfort and end up with a sight-threatening adverse event, such as microbial keratitis. It has been found that there are many reasons for the low level of compliance, including insufficient CL care education by ECPs, poor patient self-hygiene habits, obtaining CLs from unauthorized vendors, and missing after care visits [13-19]. The aims of this study are to investigate the prevalence and trends of CL wear and care among the Saudi community and compare with global trends.

2 METHODS

This is a cross-sectional study done via self-administered online questionnaire which was distributed on social media. This study was for Saudi Arabian citizen in all regions. The questionnaire was constructed to gather information regarding CL wearer demographics, education level, current job, purpose of wear, wearing habits during the day, sharing of CLs with friends, wearing hygiene, lens case replacement, and attitudes toward aftercare visits. The questionnaire was prepared by a focus group of three experienced optometrists and was drafted in the Arabic language which is the official language of the country. Google Docs was used to design the questionnaire then a pilot study was conducted with 50 participants including optometry students to determine how the questions would be interpreted and whether any further amendments or additions were required. The study protocol was approved by the research ethics committee of the College of Applied Medical Sciences at King Saud University, Riyadh, Saudi Arabia.

It is estimated that the majority of Saudi Arabian residents use social media platforms for communication[20]. Therefore, popular social media platforms were used to recruit participants by sending an invitation message with a link to the

questionnaire. The invitation campaign was run extensively by author and all co-authors from 24th July to 20th August 2016 in order to recruit participants from across the country. The survey invited Saudi Arabian CL wearers only and required all questions to be answered in order to submit the responses, which were then automatically exported to Microsoft Excel spreadsheet hence avoiding transcribing errors.

The participation in the study was voluntary with the option of discontinuing the survey at any time. Consent was obtained by participation. The data was gathered and handled in a secure file and only the author of the study had access to it. The data was used for research purposes only and no identification data was required.

Data was entered, coded, cleaned and analyzed using Microsoft Excel spreadsheet (Microsoft Office 2013) and statistical package for social science (IBM SPSS), version 23. Ddescriptive statistics has been used to describe the data. Frequency and percentages were used for qualitative variables.

3 Results

A total of 10,858 CL wearers completed the questionnaire from all five Saudi Arabian geographic regions. The central and western regions of Saudi Arabia represented the majority of the respondents (figure 1). The study population consisted of 9,640 (88.8%) females and 1,218 (11.2%) males. The frequency of age group is provided in Figure 2, where it is seen that the majority of CL wearers were in the age groups of 16-20 (35.2%) and 21-25 (35.5%).

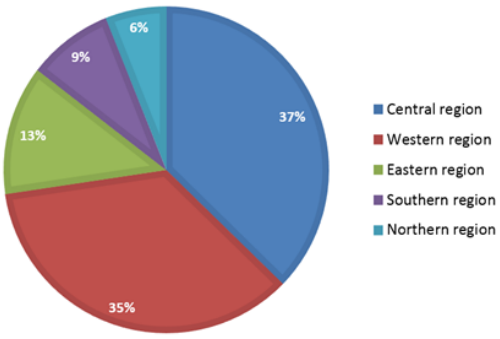

Fig. 1. Distribution of CL wearers in all Saudi Arabian geographic regions.

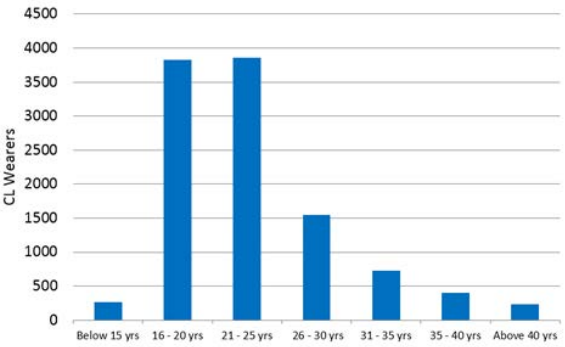

Fig. 2. Age group distribution of CL wearers.

The educational level of CL wearers showed that the majority of the respondents (66.7%) were either studying or had studied to undergraduate university level (figure 3).

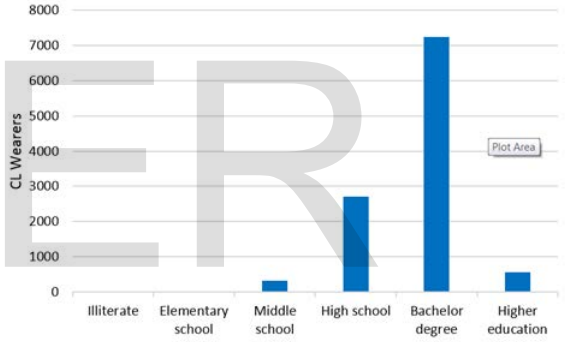

Fig. 3. Distribution of educational levels of CL wearers.

Considering the young age profile of the respondents it is not surprising that the majority were from a student population (figure 4).

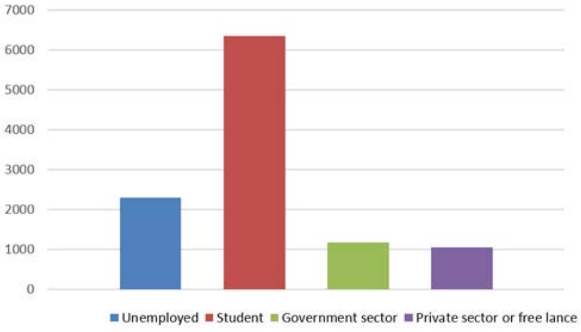

Fig. 4. Distribution of current occupations of CL wearers.

Of the participants, 8,992 (82.8%) were soft lens wearers whereas only 253 (2.3%) were rigid lens wearers, and the remaining 1,613 (14.9%) were not sure and have chosen both soft and rigid lenses. The most popular wearing modality was conventional daily wear (57.8%), daily disposable (30.3%), and extended wear (11.9%). Cosmetic was the main reason for wearing CLs (43.1%) followed by refractive correction (31.3%). as shown in Figure 5.

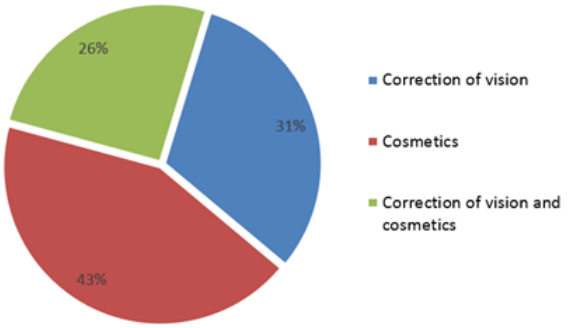

Fig. 5. Purposes of CL wear among participants.

The wearing time during the day varied among respondents, as shown in Figure 6. The majority of CL wearers (5,571, 51.3%) wore their lenses from 5 to 12 hours a day.

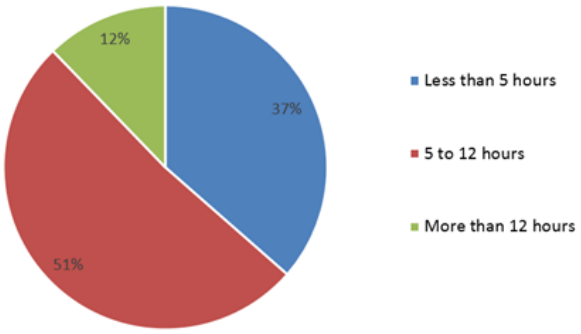

Fig. 6. Distribution of wearing time among CL wearers.

Many participants (21.8%) reported that they had slept whilst wearing their lenses at various times. Worryingly, 18.4% stated that they shared or exchanged their lenses with friends to try them out or for special occasions. The majority of shared lenses (81.4%) were cosmetic lenses. Females were much more likely to share lenses with friends (95.2%).

The majority (72.7%) stated that they washed their hands before applying and removing lenses. When questioned about lens solution and lens case replacements around half (50.2%) stated that they replaced the lens solution with fresh solution before lens storage overnight. However, only a third (32.9%) stated that they changed the CL case with every new box of solution (Table 1).

TABLE 1: THE DISTRIBUTION OF RESPONSES FOR HYGIENIC HABITS AMONG CL WEARERS.

CL care procedure	No. of CL wearers	Percentage
Hand washing		
Mostly yes	7,890	72.7 %
Mostly no	1,153	10.6 %
Sometimes	1,815	16.7 %
CL solution replacement		
Mostly yes	5,452	50.2 %
Mostly no	2,846	26.2 %
Sometimes	2,560	23.6 %
CL case replacement		
Mostly yes	3,577	32.9 %
Mostly no	5,760	53.0 %
Sometimes	1,521	14.0 %

Just over a third (37.6%) of CL wearers obtained their lenses based on a prescription form an ECP whereas around two thirds (6,772 out of 10,858, 62.4%) stated that they obtained their lenses without a prescription. Among them, 4,494 used CLs for cosmetics purposes only. Therefore, it has been found that 95.9% of coloured CLs are being worn without a prescription from an ECP.

Over half (58.8%) stated that they had not visited an ECP for an eye care checkup. The rest (41.2%) stated that they had visited an ECP on various occasions.

Most of the participants (72.7%) said they purchased their lenses through optical shops, 9.2% through pharmacies, and the remaining 18.1% from other sources such as cosmetics stores, beauty salons and online purchases.

4 DISCUSSION

In Saudi Arabia, it seems that the use of CLs for either cosmetic or corrective purposes is popular although there is no clear figure for the prevalence of CL wear among the Saudi Arabian community. Previous studies have predominantly been done with samples from universities, hospitals, and specific individuals, and therefore, are highly vulnerable to sample bias [8-12]. In contrast, the current study illustrates the prevalence and trend of CL wear and care among the Saudi

Arabian community where a large sample size was randomly selected from different areas, sexes, ages, and educational levels. To the best of our knowledge, this study is considered the largest comprehensive study in the field of CL wear and care among the Saudi community.

The CL wearers, who participated voluntarily in the study, represented different geographic areas of Saudi Arabia. The highest participation numbers were from the central and western areas (37.3% and 35.3% respectively) as shown in Figure 1. In 2016, according to the Saudi general authority for statistics, the demographic survey of the Saudi population stated that the Saudi population is about 21 million and that central and western areas have the highest population, i.e., 2 to 3 fold higher than the remaining areas [21], which explains the high number of participants from these two areas.
The majority of participants were females, students, in the age group of 16 - 25 years old and using soft CLs. Moreover, about half of the participants wore CLs for cosmetic purposes only. These findings are in close parallel with the international trends for CL use for appearance enhancement and, hence, fashion soft colored lenses are mostly bought by young females [22-26]. It also confirms the previous study on Saudi female university students, which found that the mean age of CL wearers was 20.5 years, and most of them wore CLs for cosmetic purposes only [8]. Besides fashion, it is believed that this trend of CL use is due to the easy availability and uncontrolled dispensing of these lenses.

Most of the participants obtained their lenses from optical shops. On the other hand, it was found that the majority purchase their lenses without a prescription from an ECP. A study on 1,654 beauty and pharmacy shops in Saudi Arabia found that 80.2% of shops sold plano, coloured CLs to patients without a prescription. Moreover, all these shops were unlicensed to sell CLs [8]. These findings represent the reality of CL sales in the Saudi market, as it is common to see CLs displayed inside unlicensed shops, which may make many people believe that coloured lenses with plano power are not medical devices and, hence, do not need a pre-fitting examination by or after care visit to an ECP [27]. As a result of this trend, no instructions on CL care are believed to be given to wearers, and hence, the risk of CL complications, such as microbial keratitis, would be high [4, 28-32].

Poor compliance is a significant clinical problem in everyday eye-care practices. In case of CL wear, poor compliance may lead to complications range from mild discomfort to sight threatening cases, such as microbial keratitis [33-35]. There is an association between CL wearer age and poor compliance, with the highest incidence being reported by 15- to 25-year-olds, Current Saudi Arabian population statistics are high in the age group of 20-30 years old [21], which may explain the high number of youth CL wearers and, therefore, call the health authorities to apply more health restrictions on CL sale.

Poor hand hygiene is one aspect of poor compliance and considered a major risk factors for lens-related eye diseases [36]. The majority of participants (more than 70%) exhibited a good compliance with hand washing before inserting or removing CLs. In view of the other results of this study, this is an interesting finding, as the international reported rates of non-compliance for hand hygiene range from 11% - 60% [22, 37-39]. Previous studies on Saudi CL wearers rated hand washing from 58% to 89% [8, 11]. It is believed that the culture and people's attitude toward frequent hand washing may explain this good compliance.

A significant number of participants exhibited poor compliance toward solution replacement during overnight CL storage and lens case replacement after a long period of use (49.8% and 67% respectively). This poor compliance in conjunction with the high rate of wearers who use CLs on a daily wear basis (57.8%) and who do not attend aftercare visits to ECPs (58.8%) are considered hazardous and may explain the incidence of bacterial keratitis among Saudi Arabian CL wearers [4-7].

Sleeping while wearing CLs could increase the risk of CL complications especially with lenses that are not designed for closed eye wear [40-42]. Fortunately, the majority of participants stated that they did not wear CLs while sleeping, and only 5% stated that it was their habit to sleep while wearing CLs. However, that could be because they were using high oxygen transmissibility continuous wear CLs based on their ECP's recommendation, which cannot be demonstrated through the online survey. In addition, 18.4% stated that they shared their lenses with friends (to try the lens or to attend certain events), which is considered a quick way to transfer eye infections between wearers. Most shared lenses were used for cosmetic purposes only, and females were dominant in sharing lenses (95.2%). This is very similar to another study which rated CL sharing to be at 27.6%. It could be said that this dangerous practices is an expected outcomes of the unauthorized sale of CLs.

The results of this study seem to be relatively parallel with other international studies on poor CL compliance although different measurement methods and sample sizes have been used. [22, 39, 43-47]. In 1997, Nathan Efron proposed a compliance enhancement model containing four components i.e. the practitioner, the patient, the instructions, or advice, which are given to the patient and the CL manufacturer. By enhancing these aspects, a high level of compliance could be achieved [47]. In Saudi Arabia, health authorities have the power to (a) legalize CL dispensing through ECPs only, (b) ensure that the practitioner delivers proper CL care instructions to patient and (c) run CL awareness programs via TV channels and social media.

It is hoped that the findings of this study can help (a) Saudi health authorities in controlling CL dispensing as well as promoting CL awareness programs to the community, (b) ECPs and CL suppliers in understanding the trend of CL wear and how to enhance it and (c) the CL industry in developing CLs and CL care products that are suitable to the region's de-

mands.

This study was limited by the fact that it is a survey study done via convenient sampling (online) and limited to social media, the results however are noteworthy for quality improvement. It was not possible to estimate how many people will have seen the questionnaire and did not fill it to estimate the response rate.

In conclusion, this study presents the prevalence and characteristics of CL wear and care in all five geographical areas of Saudi Arabia. The majority of CL wearers were females, young students and use soft lenses. There were poor compliance in most aspects of CL wear. It is believed that the results will help health authorities and ECPs in planning better CL services and will provide a baseline for comparison with other countries. Restricted rules need to be applied by health authorities in order to regulate CL sale, wear, and care.

CONFLICT OF INTEREST STATEMENT

No competing financial interests exist by all authors.

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