Journal of Clinical & Experimental Ophthalmology

Reddy et al., J Clin Exp Ophthalmol 2016, 7:1
DOI: 10.4172/2155-9570.1000522

Research Article Open Access

# A Survey of Dry Eye Symptoms in Contact Lens Wearers and Non-Contact Lens Wearers among University Students in Malaysia

**Sagili Chandrasekhara Reddy[1,2*], Khoo Hui Ying[3], Lee Hooi Theng[3], Ooi Tze How[3], Paul Kong Fu-Xiang[3] and Mohamed Muhshin bin Mohamed Sikander[3]**

[1]*Department of Ophthalmology, Faculty of Medicine Clinical School, International Medical University, Seremban, Nageri Sembilan, Malaysia*

[2]*Department of Ophthalmology, Faculty of Medicine and Defence Health, National Defence University of Malaysia, Kem Sungai Besi, Kuala Lumpur, Malaysia*

[3]*Phase II Medical Students, Faculty of Medicine Clinical School, International Medical University, Seremban, Nageri Sembilan, Malaysia*

[*]**Corresponding author:** Prof. Dr. Sagili Chandrasekhara Reddy, Department of Ophthalmology, Faculty of Medicine and Defence Health, National Defence, University of Malaysia, Kem Sungai Besi, 57000 Kuala Lumpur, Malaysia, Tel No: +6013-6244532; E-mail: profscreddy@gmail.com

**Received date:** November 30, 2015; **Accepted date:** February 09, 2016; **Published date:** February 16, 2016



## Abstract

**Objective:** To determine the prevalence of dry eye symptoms in contact lens wearers and non-contact lens wearers among university students, and to find out any association between dry eye symptoms and gender in these students, dry eye symptoms and computer usage in contact lens wearers.

**Material and methods:** This study was conducted among the medical and pharmacy students aged between 18 and 28 years. Contact lens dry eye questionnaire (CLDEQ) for contact lens wearers and dry eye questionnaire (DEQ) for non-contact lens wearers were used in this study. Both forms consisted of questions on the age, gender, common symptoms and mode of relief etc. The character of the symptoms was measured with the dimensions of frequency and intensity. The filled questionnaires were analyzed using SPSS software.

**Results:** The dry eye questionnaires were completed by 627 students (461 DEQ and 166 CLDEQ). Females 406 (64.8%) were more than males 221 (35.2%) and majority of them were non-contact lens users in both genders. Our study showed that all the symptoms of dry eye were significantly more prevalent in contact lens wearers when compared to non-contact lens wearers. The most common symptom of dry eyes experienced in contact lens wearers was dryness of eyes (73.5%), while tired eyes (77%) was the most common symptom in non-contact lens wearers. The study also showed an increasing trend in frequency and intensity of symptoms as the day passed by, with the highest intensity at the end of the contact lens wearing time. The dry eyes symptom was noted significantly more often in students using computer for more than 2 hours daily.

**Conclusion:** Symptoms of dry eyes are more frequent in contact lens wearers than in non-contact lens wearers, with an increasing trend of their frequency and intensity at the end of the day.

**Keywords:** Dry eye questionnaire; Contact lens dry eye questionnaire; Dry eye symptoms; Contact lens wearers; Computer usage

## Introduction

Dry eye syndrome is a condition caused by decreased tear production, increased tear evaporation or instability in tear film. These factors may produce inadequate lubrication of the conjunctiva and cornea. The abnormalities usually involve one or more components of tear film or position of eyelids. Dry eyes also may be caused by other factors such as aging process, environment, medications, extended computer work or reading, corneal surgery and contact lens wear [1]. It has been reported that the dry eye symptoms are more common and intense among the contact lens wearers when compared to the non-contact lens wearers [2]. It has been also shown that dryness and discomfort of the eyes are the primary reasons for the contact lens wearers to cease lens wear [3-5]. The Contact Lens Dry Eye Questionnaire (CLDEQ) was developed to assess the intensity and severity of the symptoms of dry eyes in people wearing contact lenses while the Dry Eye Questionnaire (DEQ) was designed to assess the symptoms of dry eyes in those who are not wearing contact lenses [3]. These questionnaires are for the cross sectional study to make comparison among patients who were diagnosed with dry eye in order to see whether the contact lens do predispose the intensity of the dry eye.

Beglay et al. reported that the most frequent ocular symptom was dryness and the least frequent was soreness among 83 contact lens wearers through a survey questionnaire. There was a significant shift towards increased symptoms in the evening compared with the morning [6]. A survey of practitioners in USA on the management of dry eye symptoms in soft lens wearers showed that 18% to 30% of soft contact lens patients reported symptoms of dry eye, 12% to 21% were symptomatic enough to reduce their contact lens wearing time, and 6% to 9% could not wear contact lenses because of dryness symptoms [7]. The Canadian dry eye epidemiology study reported the prevalence of dry eye symptoms presenting to optometric practice to be 27.8% as determined by patient questionnaires [8].

The ocular dryness does not have clear connection with the signs and symptoms [9,10]. The patients, who wear contact lens with persistent symptoms of dry eye, often have negative results from tests for objective signs. Regardless of the presence of symptoms, almost all contact lens wearers have tear instability. It is difficult to determine the

precise mechanisms of the contact lens-related dry eye with these loose correlations, but measurement of symptoms is a good outcome measure since they are related directly to the patients experience with contact lens [2]. Dryness symptoms associated with use of video display terminals (computers and monitors) have been reported [11].

Students, especially contact lens wearers, might present with intensive dry eye symptoms because of other reasons such as extensive usage of computer which is one of the predisposing factors of dry eye [1,5].

Different from the previous studies where the survey was conducted among the hospital/ clinic attending population about dry eye symptoms, this paper focused on the university student population. However, the questionnaires CLDEQ and DEQ used in this study were same [3].

We conducted this study among university students to determine the prevalence of dry eye symptoms among contact lens wearers and non-contact lens wearers, and to find out any association between dry eye symptoms and gender in these students, dry eye symptoms and computer usage in contact lens wearers.

## Material and Methods

This study was conducted among the undergraduate medical, pharmacy and postgraduate pharmacy students of International Medical University, Malaysia, aged between 18 and 25 years over a period of six months. The students were explained the purpose of the research project and consent was taken for their participation. Then, the questionnaires were given depending on the use of contact lenses. Contact lens dry eye questionnaire (CLDEQ) for contact lens wearers and dry eye questionnaire (DEQ) for non-contact lens wearers were used in this study [3]. Students using contact lenses for the past 4 weeks or more were considered as contact lens wearers. This was an elective study for Phase II medical students and it was approved by the Institutional review board of the university.

Both questionnaires were similar, except that contact lens wearers were asked to report the symptoms they experienced while wearing contact lenses. Both questionnaires included categorical scales to measure the prevalence, frequency, diurnal severity, and occurrence of common ocular surface symptoms. Ocular symptoms that were assessed included discomfort, dryness, blurring of vision, soreness and irritation, foreign body sensation, burning and stinging, and sensitivity to light. The questionnaire also included questions about how ocular symptoms affected daily activities, questions concerning computer use, history of contact lens wear, self-assessment whether the subjects thought that they had dry eye, and whether subjects have been previously diagnosed to have dry eye [3]. Age and gender were filled up in the questionnaire by the respondents. The filled questionnaires were collected and analyzed using SPSS software. Chi square test was used to find out any association between dry eye symptoms and gender in these two groups of students, dry eye symptoms and computer usage in contact lens wearers.

## Results

### Study population

A total of 734 students were given the survey questionnaires and 107 (14.6%) students did not return the form; the response rate was 85.4% (627 out of 734 students). Among the students who responded, 166 (26.5%) were wearing the contact lenses while 461 (73.5%) students were not using contact lenses; females 406 (64.8%) were more than males 221 (35.2%). The students were aged between 18 and 28 years; 157 (25%) were aged 18-20 years, 460 (73.4%) in 21 and 25 years age group and 10 (1.6%) in 26-28 years age group.

### Contact lens wearers

Among 166 contact lens users, 2 (1.2%) were using rigid gas permeable lenses, 9 (5.4%) daily wear soft lenses, 143 (86.1%) frequent replacement soft lenses and 12 (7.2%) disposable soft lenses. The daily wearing time of contact lenses ranged from 4 to 12 hours (mean 5.5 hours) and weekly wearing time from 10 to 36 hours (mean 12.2 hours).

All the symptoms of dry eyes shown in figure 1 were noted "sometimes" only in majority of the students, while very few had these symptoms constantly. The most common symptom experienced by contact lens wearers was dry eye (73.5%) and the least frequent was sensitivity to light (19.9%). The other symptoms were discomfort (62.6%), blurring of vision (58.4%), grittiness/scratchiness (53%), foreign body sensation (51.2%), soreness and irritation 950.6%), and burning sensation/stinging (34.9%). Some of the students experienced more than one symptom. In general, the frequency of dry eye symptom was nearly same in students wearing soft contact lenses.

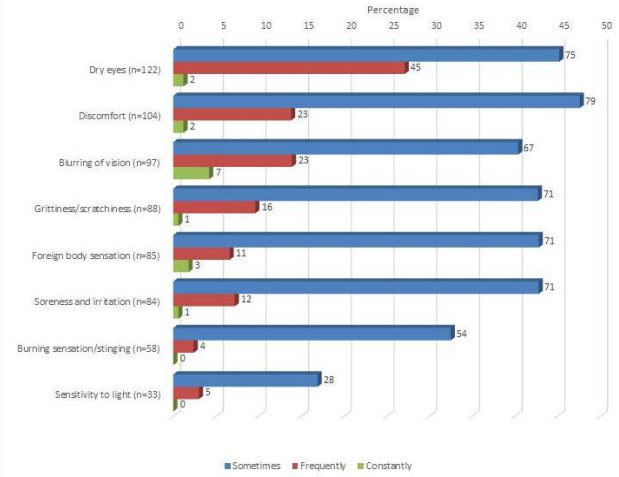


**Figure 1:** Frequency of dry eye symptoms in contact lens wearers (n=166).

All the symptoms were experienced more often "at the end of contact lens wearing time" when compared to within first 2 hours of wearing and in the middle of the day (Figure 2). At the end of contact lens wear, the dry eye symptoms were of "intense" nature in majority of the students (Figure 3).

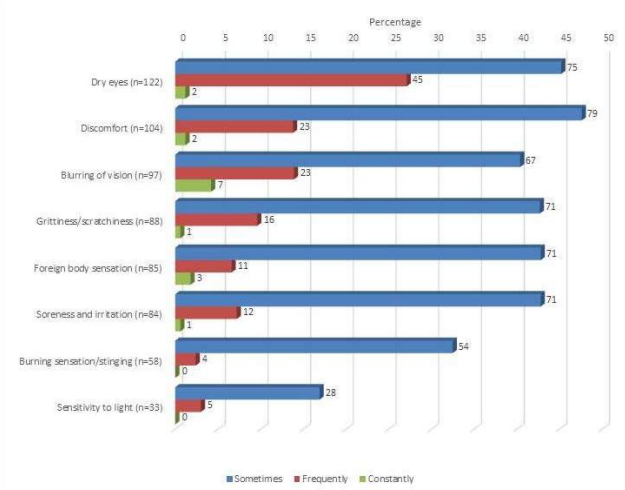


**Figure 2:** Dry eye symptoms at different times of the day among contact lens wearers (n=166).

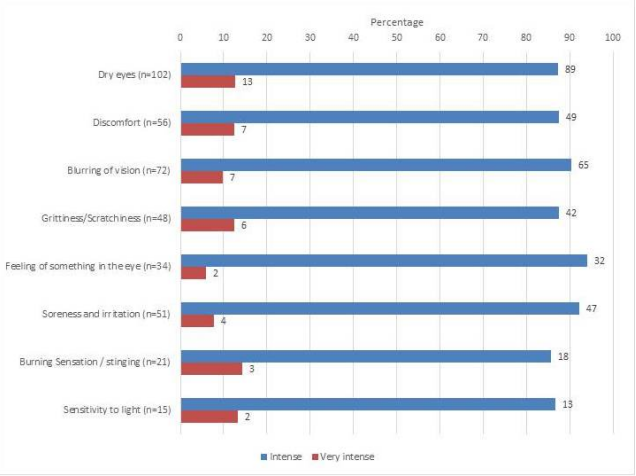


**Figure 3:** Intensity of dry eyes symptoms at the end of the day of contact lens wearing (n=166).

Contact lens wearers used the computer on a working day from 6 to 12 hours (mean 3.5 hours) and 134 (80.7%) students reported 2 hours or more usage of computer. The use of computer on a leisure (non-working) day was 9 to 18 hours (mean 5.5 hours) and 145 (87.3%) students reported 2 hours or more usage of computer. The dry eyes symptom was noted significantly more often in students using computer for more than 2 hours daily (Table 1).

Sixty-four out of 166 (38.5%) contact lens wearers removed the contact lens to get relief of the eye symptoms. The reasons to take out the contact lens, in the order of frequency, were eye discomfort (40.3%), itching in the eye (35.5%), dry eyes (32.5%), eye soreness (31.5%), eye scratchiness and sting (19.9%), and sensitivity to light (7.8%). The rest of the students (102, 61.5%) used artificial tears to get rid of their symptoms.

| Group | Computer use on working day Chi Square=12.45, P=0.001 | | | Computer use on leisure day Chi Square=12.28, P=0.001 | | |
|---|---|---|---|---|---|---|
| | <2 hrs (n=32) | 2-6 hrs (n=112) | 7-18hrs (n=22) | <2 hrs (n=21) | 2-6 hrs (n=89) | 7-18hrs (n=56) |
| With symptoms of dry eye (n=122) | 24 (75.0%) | 82 (73.2%) | 16 (72.3%) | 14 (70.0%) | 69 (77.5%) | 39 (69.6%) |
| Without symptoms of dry eye (n=44) | 8 (25.0%) | 30 (17.9%) | 6 (27.3%) | 7 (30.0%) | 20 (22.5%) | 17 (30.4%) |

**Table 1:** Association of computer usage and symptom of dry eyes in 166 contact lens wearers.

Among 166 contact lens wearers, 102 (61.4%) responded that they have dry eyes (self-assessment) while 64 (38.6%) reported that they do not have dry eyes. Only 12% of students (20 out of 166) were told previously during eye checkup that they have dry eye syndrome.

## Non-contact lens wearers

All the symptoms of dry eyes shown in Figure 4 were noted by majority of students "sometimes" only while very few had these symptoms constantly. Tired eye was the most frequent symptom (77%) experienced in non-contact lens wearers and the least frequent was burning sensation/stinging (21.5%). The other symptoms were discomfort (45.1%), grittiness/scratchiness (38.4%), dry eyes (33.2%), and blurring of vision (25.5%). Some of the students experienced more than one symptom.

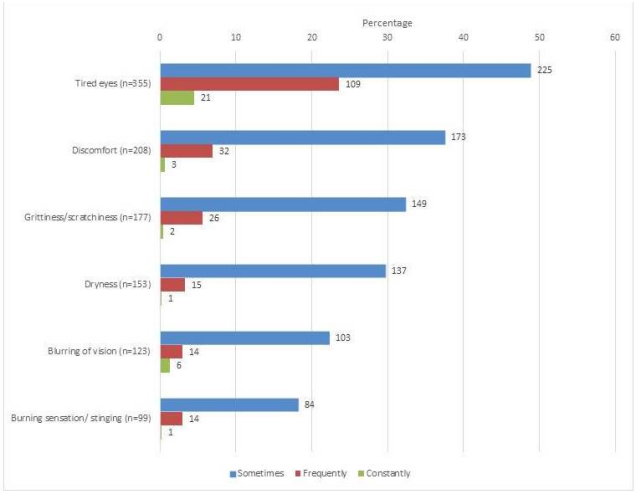


**Figure 4:** Frequency of dry eye symptoms in non-contact lens wearers (n=461).

**Among the dry eye symptoms in non-contact lens wearers, large number of students had all the symptoms more often "at the end of the day"** (Figure 5). Majority of the students claimed that they were "bothered" with the dry eye symptoms; only small percentage of students felt that the symptoms were bothering extremely (Figure 6).

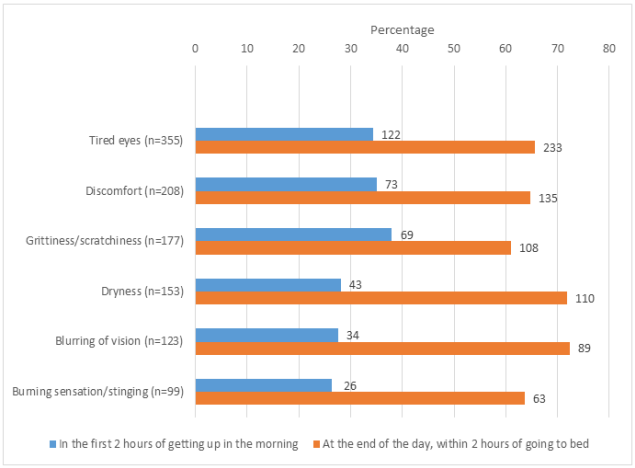


**Figure 5:** Dry eyes symptoms at different times of the day among non-contact lens wearers (n=461).

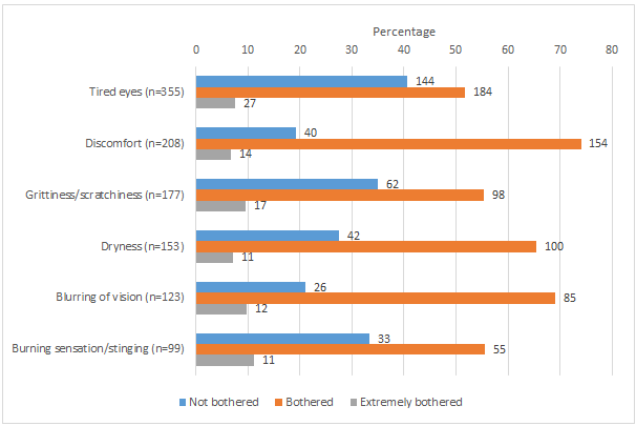


**Figure 6:** Intensity of dry eye symptoms in non-contact lens wearers (n=461).

The non-contact lens wearers coped with their dry eye symptoms by either closing the eyes (351, 76.2%), using artificial tears (123, 26.6%), or other treatments (27, 5.9%) which included lubricating ointment or gel, warm compression of the eye or eyelid scrub, room humidifier.

Among 461 non-contact lens wearers, 111 (24.1%) responded that they have dry eyes (self-assessment) while 350 (75.9 %) reported that they do not have dry eyes. Only 5.9 % of students (27 out of 461) were told previously during eye checkup that they have dry eye syndrome.

The data mentioned in the results analysis about the dry eye symptoms were from the responses of questionnaire survey only. The dry eye syndrome assessment tests (slit lamp examination, Schirmer test, tear film break up time, rose bengal staining) were not performed in this study.

## Discussion

All the symptoms of dry eye were more frequently reported in contact lens wearers than in non-contact lens wearers. The most frequent symptom in contact lens wearers was dry eyes (73.5%) while the same was discomfort (45.1%) in non-contact lens wearers (Table 2). The dry eye symptom was significantly more in contact lens users than in non-contact lens users (Chi square=94.177; p=0.001), (Table 3).

| Symptoms | Contact Lens Users (n=166) | Non-contact lens users (n=461) |
|---|---|---|
| Dry eyes | 122 (73.5%) | 153 (33.2%) |
| Discomfort | 104 (62.6%) | 208 (45.1%) |
| Blurring of vision | 97 (58.4%) | 123 (25.5%) |
| Grittiness/scratchiness | 88 (53.0%) | 177 (38.3%) |
| Burning sensation/ stinging | 58 (34.9%) | 99 (18.6%) |

**Table 2:** Comparison of frequency of dry eye symptoms in contact lens wearers and non-contact lens wearers.

The timing of dry eye presentation differed among contact lens users and non-contact lens users (Table 4). There was an increase of dryness symptom and time of wearing from 9.8% within first 2 hours of wear (AM) to 77.9% end of wearing time (PM) in contact lens users.

| Group | Contact lens users (n=166) | Non-Contact lens users (n=461) |
|---|---|---|
| With symptom of dry eyes | 122 (73.5%) | 153 (33.2%) |
| Without symptom of dry eyes | 44 (26.5%) | 307 (66.8%) |

**Table 3:** Presence or absence of dry eyes symptoms among contact lens user and non- contact lens users.

| Symptoms | Contact Lens Users | Non-contact lens users |
|---|---|---|
| AM Dryness | 12 (9.8%) | 24(15.7%) |
| PM Dryness | 95 (77.9%) | 43(28.1%) |

**Table 4:** Timing of dry eye symptom presentation among contact lens users and non-contact lens users.

Chalmers and Begley reported 76.8% dryness symptoms with 26.8% citing frequent to constant symptoms in contact lens wearers. Significantly higher intensity of symptoms was reported late in the evening day compared to earlier in the day, with an increase from 12.7% in the first 2 hours of wear to 28.5% late in the day [2].

Sapkota et al. conducted a questionnaire survey of ten common symptoms among 129 soft contact lens wearers in Nepal and reported that discomfort was the most common symptom in 88.4% and headache was the least symptom in 36.4% of subjects. The other symptoms were foreign body sensation 73.6%, redness 65.9%, reduced wearing time 63.6%, dryness 62.8%, blurring of vision 59.7%, watering 58.1%, itching 42.6% and burning 41.1%. The degree of symptoms was not associated with age, gender, profession, education status, ethnicity of subjects and duration or modality of lens wear [12].

We found that the dry eyes symptom was experienced significantly more often in students using computer for more than 2 hours daily, on working day as well as on a leisure (non-working) day. The reasons for this are unknown but the facts of occupational stress and environmental conditions at the workplace which are different in the house should be taken into consideration. A further study to explore the relationship of computer usage and dryness of the eyes may provide some answer for this. However, Chalmers and Begley (2006) reported that there was no-dose response relationship to increasing computer use and dryness symptom in contact lens wearers [2].

Our study showed an increasing trend in frequency and intensity of symptoms as the day passed on, with the highest intensity at the end of the contact lens wearing time. A similar finding was reported by Begley et al [3,6].

In our study of university students, 61.4% of contact lens wearers responded (self- assessment) that they have dry eyes and this figure was much higher than 17.7% reported by Chalmers and Begley in contact lens wearers [2]; while 24.1% of non-contact lens wearers reported (self-assessment) to have dry eyes in our study and it was much higher than the figure (12.4%) reported by same authors in non-contact lens wearers [2].

| Symptoms | Contact lens users (Chi-Square =13.78; p=0.009) | | Non-contact lens users (Chi-Square =15.48; p=0.001) | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| With symptoms of dry eye | 13/122 (10.7%) | 109/122 (89.3%) | 61/153 (39.9%) | 92/153 (60.1%) |
| Without symptoms of dry eye | 8/44 (18.2%) | 36/44 (81.8%) | 139/307 (45.3%) | 168/307 (54.7%) |

**Table 5:** Association of subjects' gender with symptoms of dry eye among contact lens users and non-contact lens users.

Our study showed that the majority of contact lens wearers were females. This may be due to a particular trend in the current world fashion in which females strive to look good (without spectacles). Whatever may be the reason for the huge difference between the genders with regards to contact lens usage, the symptoms of dry eye were significantly more frequent in females when compared to males in contact lens wearers as well as in non-contact lens wearers (Table 5). We are unsure why females are more susceptible to dry eye symptoms. However, Chalmers and Begley reported that contact lens related dryness is not associated with gender and occurs at a higher frequency and intensity in both males and female contact lens wearers [2].

## Conclusion

Our study showed that all the symptoms of dry eye were significantly more prevalent in contact lens wearers when compared to non-contact lens wearers. The study also showed an increasing trend in frequency and intensity of symptoms as the day passed on, with the highest intensity at the end of the wearing time. We found that dry eye symptom was the most prevalent in people using computer for more than 2 hours on working day as well as on and leisure (non-working) day. The most common symptom of dry eyes experienced in contact lens wearers was dryness of eyes (73.5%) while tired eyes (77%) was the most common symptom of dry eyes in non-contact lens users. More than one-third of contact lens wearers get relief of the symptoms in the eyes by removing the lenses.

## References

1. Friedman NJ, Kaiser PK (2007) Essentials of Ophthalmology, 1st ed. Elsevier, Philadelphia pp: 156-157.
2. Chalmers RL, Begley CG (2006) Dryness symptoms among an unselected clinical population with or without contact lens wear. Cont Lens Anterior Eye 29: 25-30.
3. Begley CG, Chalmers RL, Mitchell GL, Nichols KK, Caffery B, et al. (2001) Characterization of ocular surface symptoms from optometric practices in North America. Cornea 20: 610-618.
4. Pritchard N, Fonn D, Brazeau D (1999) Discontinuation of contact lens wear: a survey. Int Contact Lens Clin 26: 157-162.
5. Young G, Veys J, Pritchard N, Coleman S (2002) A multi-centre study of lapsed contact lens wearers. Ophthalmic Physiol Opt 22: 516-527.
6. Begley CG, Caffery B, Nichols KK, Chalmers R (2000) Responses of contact lens wearers to a dry eye survey. Optom Vis Sci 77: 40-46.
7. Orsborn GN, Zantos SG (1989) Practitioner survey: management of dry eye symptoms in soft lens wearers. Contact Lens Spectr 4: 23-26.
8. Doughty MJ, Fonn D, Richter D, Simpson T, Caffery B, et al. (1997) A patient questionnaire approach to estimating the prevalence of dry eye symptoms in patients presenting to optometric practices across Canada. Optom Vis Sci 74: 624-631.
9. Begley CG, Chalmers RL, Abetz L, Venkataraman K, Mertzanis P et al. (2003) The Relationship between Habitual Patient-Reported Symptoms and Clinical Signs among Patients with Dry Eye of Varying Severity. Invest Ophthalmol Vis Sci 44: 4753-4761.
10. Nichols KK, Nichols JJ, Mitchell GL (2004) The lack of association between signs and symptoms in patients with dry eye disease. Cornea 23: 762-770.
11. Blehm C, Vishnu S, Khattak A, Mitra S, Yee RW (2005) Computer vision syndrome: a review. Surv Ophthalmol 50: 253-262.
12. Sapkota K, Martin R, Franco S, Lira M (2015) Common symptoms of Nepalese soft contact lens wearers: A pilot study. J Optom 8: 200-205.