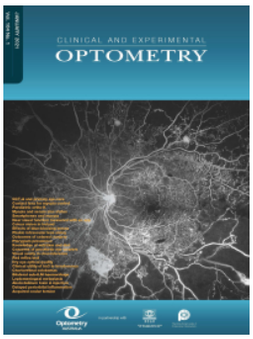

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RESEARCH

# A survey on knowledge and attitude of Saudi female students toward refractive correction

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**Background:** To assess the general knowledge and attitude of refractive error correction methods among female Saudi university students.
**Methods:** One thousand, one hundred and sixty-five female university students, between 17 and 32 years of age were randomly interviewed using self-administered questionnaires with open and closed-ended questions. The questions collected information on demographics (gender, age, educational status, college of study, and occupation), addressed general knowledge/perception of the difference between the professions of ophthalmology and optometry, and attitudes toward spectacle, contact lens (CL) usage, including coloured prescription CLs, and refractive surgery for correcting refractive errors.
**Results:** The response rate was 90 per cent (1,052/1,165). Fifty-two per cent had never had an eye examination and only 28 per cent correctly identified the difference between an 'ophthalmologist' and 'optometrist'. Eighty-one per cent knew that CLs instead of spectacles (81.8 per cent), and coloured CLs (89.7 per cent) can be used for correcting refractive errors. Concerning refractive surgery, although a majority (90 per cent) knew that the technique corrects refractive error and reduces dependency on spectacles/CLs, only five per cent had experienced refractive surgery. Approximately, 46 per cent and 47 per cent used spectacles and CLs, respectively, and while the optometrist was the main source of CL prescriptions (41 per cent), most people visited the ophthalmologist for their eye examination (68 per cent). Surprisingly, 52 per cent had never had an eye examination, or had only had one or two eye examinations (50 per cent) in their lifetime. While 23 per cent of spectacle wearers chose to continue with spectacles at the end of the study, 64 per cent and 12 per cent preferred refractive surgery and CLs, respectively, for refractive correction. Lack of information and fear of complications, but not cost, hindered most people from uptake of CLs and refractive surgery.
**Conclusion:** The students demonstrated high levels of knowledge and awareness of refractive correction methods, especially for refractive surgery. Although many consulted the optometrist or ophthalmologist for their eye examinations and corrective devices, many remain uncorrected and unaware of the main difference between both professions. The lack of information about correction methods and fear of complications may have affected their interest in uptake of eye services and should be addressed to increase uptake and prevent avoidable vision loss.

**Key words:** awareness, blindness, contact lens, eye-care practitioner, myopia, refraction, refractive surgery, spectacles, visual impairment

Visual impairment is a major global health issue affecting about 160 million people, among whom 37 million are blind, and 125 million have severe visual impairment.[1] Uncorrected refractive error is the major cause of visual impairment in 200–250 million people and the second leading cause of global blindness (21 per cent).[2] The majority of people with visual impairment reside in developing countries, including Saudi Arabia,[3] and are mostly students[4] and predominantly women.[5] Visual impairment has been associated with socioeconomic losses for society,[6] and causes difficulties in physical function, emotional distress, low socialisation, and overall decrease in quality of life for the affected person.[7]

The World Health Organization recognised the impact of uncorrected refractive error in its global initiative, Vision 2020 - The Right to Sight, which is focused on reducing the rising prevalence of visual impairment and eliminating avoidable blindness by 2020 with emphasis on refractive error correction. The organisation also stated the need for population-based data on visual impairment to enhance treatment and rehabilitation services, planning, and implementation of the blindness prevention program, as well as determine research priorities for different populations.[8]

In Saudi Arabia, the prevalence of refractive error is still unknown, but studies have demonstrated significant association


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between myopia prevalence and Middle Eastern origin.[9] In a study conducted in the south-western region of Saudi Arabia (the Al Bisha region), refractive errors were the cause of 68 per cent of impairments within the visually impaired population (11 per cent).[10] Other studies conducted among primary school children aged 6–14 years, and older adults aged 18 years and above who were recruited from a primary care centre in the northern region of Saudi Arabia, the estimated prevalence of refractive error was 13.7 per cent[11] and 36 per cent,[12] respectively. A higher prevalence was reported among medical students aged 19–25 years (83.1 per cent), particularly for myopia (65.7 per cent of cases).[13] The study also found that students with refractive error were more likely to be females (odds ratio [OR] 1.39, $p = 0.012$), living in rural areas (OR 2.40, $p = 0.001$) or aged 12–14 years (OR 9.02, $p = 0.001$).[11] The high rate of visual impairment due to uncorrected refractive error in this region suggests the urgency of a public ocular health intervention strategy, especially when two-thirds of the cases of vision loss can be avoided through prevention and treatment packages that are proven to be cost effective.[6]

Although it appears that spectacles were the most used method of visual correction among a student population,[4] Riley and Chambers noted that no single preferred method of correction is acceptable to all patients. Some may prefer spectacles over contact lenses (CLs) and refractive surgery, whereas others may prefer CLs or refractive surgery for refractive error correction/treatment.[14] Despite the higher cost of refractive error correction in relation to the cost of an eye examination (US$22.8 billion[15] versus US$1 billion[16]), intervention packages for refractive correction could yield up to five-fold return on investment for government[6] and reduce patients' dependencies, improve quality of life and overall well-being of the affected individuals.[17]

As refractive errors are common in the Middle Eastern region, previous studies have examined the prevalence and related factors, but no study has investigated the opinion/perception of the public on refractive error correction methods. Awareness about refractive error and other eye problems including their treatments play important roles in blindness prevention. It has also been noted that an informed public is more likely to be sensitive to focused prevention programs and comply with recommended treatment plans.[18] This cross-sectional study assessed the knowledge and attitude of refractive error correction methods among women undergraduates and their knowledge of the differences between eye-care practitioners in the region. The findings would offer useful details for proper health policies which can be used to design targeted programs and/or improve eye-care services, particularly among educated women.

## Methods

### Ethics

Prior to commencement of this study, approval was obtained from the Research Ethics Committee of the College of Applied Medical Sciences, King Saud University, Riyadh (girls' campus and common first year) and the study was performed in accordance with the Declaration of Helsinki of 1975, as revised in 2000. An informed verbal consent was also obtained from all participants prior to enrolment, after the study protocol (and their rights as participating subjects) had been explained by the research co-ordinator.

### Questionnaire design

This descriptive, survey-based study adopted a similar standardised protocol used in another study.[19] However, the questionnaire was modified to be administered in Arabic for suitability to our audience. Prior to sending out the final survey, 10 randomly selected optometry students from King Saud University, independent from the study, completed the initial survey drafted in both English and Arabic. This was to determine how the questions were interpreted and whether any further amendments or additions were required. The amended questionnaire was again completed by a different group of randomly selected optometrists and ophthalmologists working in King Saud University hospital ($n = 10$). In addition, the questions were checked for the similarity of the interpretation in both languages. The results (not shown) suggested that no misunderstanding of the questions had occurred in both languages.

The final version of the questionnaire gathered information related to the awareness and insight of the general population on the refractive correction survey and was randomly sent out to female students of King Saud University between March and August 2018, aged $20.4 \pm 1.7$ years (mean $\pm$ standard deviation [SD]; range 17–32 years). The participation of only women in this study was partly because the university was a 'women only' institution and females have high rates of CL awareness.[14,20] However, since gender has been shown to have no significant effect on both the awareness of spectacle users of all ages,[21] and the quality of life of refractive surgery candidates,[22] the involvement of only females was considered adequate and convenient for the purpose of this study.

The items in the survey have been previously described.[19] The questionnaire consisted of five sections with 25 elements utilising both closed and open-ended formats. The closed-ended questions were structured in the form of 'Yes/No' and multiple choice with an option for 'other' whereas the open-ended questions provided answers to the related closed-ended questions and were added to double-check the participants' answers. The questions addressed in the first section of the survey provided information on the respondents' demographic data such as gender, age, educational status and occupation as well as their parents' educational status. It was also key to determine the respondents' ability to distinguish between an ophthalmologist and an optometrist. In the remaining three sections of the questionnaires, the questions were key to evaluating the respondents' attitudes toward spectacle correction, CLs and refractive eye surgery as modalities of vision correction.

Respondents were required to answer the closed-ended questions by placing an 'x' mark over the box next to the response that they have chosen with enough space provided for respondents' answers after every open-ended question.

### Data analysis

Questionnaires were included in the analysis if they were completed by university students and excluded if the students were interns or had participated in the initial validation of this questionnaire. The results were entered into a Microsoft Excel spreadsheet. For categorical variables with closed-ended question requiring a 'Yes' or 'No' response, in the questionnaire, a scoring system of '1' or '2', respectively, was performed. Similarly, for multiple choice questions such as that on 'who prepared your

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cosmetic contact lenses prescription?', with options given as 'Optometrist', 'Ophthalmologist' and 'others', the scoring was performed as '1', '2' and '3' respectively. All statistical analyses were carried out using Statistical Package for Social Sciences for Windows (Version 25, IBM, Armonk, NY, USA). All tests were two-tailed with the threshold for statistical significance set at five per cent. Continuous variables were analysed using analysis of variance and discrete variables using the chi-squared test. Simple frequency tables were used to establish the frequency distribution of the responses and relationship between variables assessed by logistic regression. For the logistic regression, confidence intervals including '1.00' were not statistically significant. Percentages were calculated for valid responses only.

## Results

Out of the 1,165 questionnaires that were distributed, 1,052 (90.3 per cent) completed surveys were returned and were included in the analysis. All surveys were completed by female undergraduate students of King Saud University aged $20.4 \pm 1.7$ years (range 17–32 years). For the purposes of analysis, the colleges were grouped into health (Pharmacy, Nursing, Dentistry, and Applied Medical Sciences), non-health colleges (Business Administration, Computer Science, Humanities) and common first year (previously known as preparatory year) in Table 1.

| Demographics | Responses, n (%) |
|---|---|
| Age, years, mean (SD) | 20.4 (1.7) |
| ≤ 20 years | 630 (59.9) |
| > 20 years | 421 (40.0) |
| Year of study | |
| Common first year (preparatory year) | 112 (10.6) |
| Undergraduate year | 939 (89.3) |
| College | |
| Health | 201 (19.1) |
| Non-health (sciences and humanities) | 738 (70.2) |
| Common first year (preparatory year) | 112 (10.6) |
| Parents' educational status | |
| Mother | |
| College/university | 490 (46.6) |
| Primary/secondary | 562 (53.4) |
| Father | |
| College/university | 585 (55.6) |
| Primary/secondary | 467 (44.4) |
| Have you ever had an eye examination? | |
| Yes | 507 (48.2) |
| No | 545 (51.8) |
| If yes, how many times have you had an eye examination?† | |
| Once/twice | 252 (49.7) |
| Multiple/annually | 184 (36.3) |
| If yes, examination was conducted by:† | |
| Optometrist | 119 (23.5) |
| Ophthalmologist | 347 (68.4) |
| Both | 23 (4.5) |
| Others‡/don't know | 18 (3.6) |
| Do you know the difference between an ophthalmologist and optometrist? | |
| Yes | 226 (21.5) |
| No | 825 (78.4) |
| Correctly identified the difference between ophthalmologist and optometrist† | 52 (26.7) |

Where the proportions do not add up to 100%, there were some non-respondents.
†Denominators were less than the 1,052 women for these sub-group analyses.
‡Includes general practitioners and nurses.

**Table 1. Socio-demographic characteristics of female students (n = 1,052) in the Riyadh Province and their responses on spectacle lens awareness**

## Respondents' views of the differences between ophthalmologists and optometrists

Forty-eight per cent of participants reported they had previously had an eye examination at least once in their lifetime and were seen by eye-care practitioners, while more than half of the respondents had never had an eye examination (Table 1). Respondents reported that reduced vision and ocular inflammation/infection were the main reasons they visited the ophthalmologist or optometrist for an eye examination (Figure 1).

When asked if they knew or understood the difference between an ophthalmologist and optometrist, 78.5 per cent did not know or understand the difference between the professions. Only 27.7 per cent of those who claimed they knew the differences (n = 226) correctly identified an ophthalmologist as one who is trained to correct vision problems, diagnose, treat eye-related diseases and perform eye surgeries and an optometrist as one who corrects vision problems, and orders their spectacles (Figure 2). Current spectacle users were more likely to correctly identify the difference between both professions (OR 0.58, 95% CI 0.35/0.98; p = 0.041) and although female students in health courses were 66 times (95% CI 0.44/1.01) more likely to correctly identify the differences compared to those in non-health courses, this failed to reach significance (p = 0.054).

## Respondents' awareness and attitudes toward the use of spectacles for vision correction

Table 2 presents the breakdown of responses to questions assessing the knowledge and awareness about the use of spectacles. Sixty per cent of respondents had a history of spectacle use and 38.9 per cent believed that these limited their daily living


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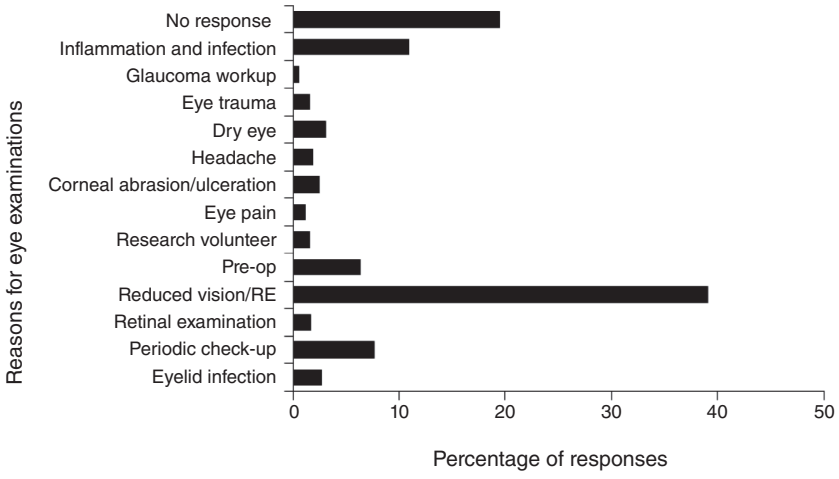


**Figure 1. Reasons for eye examination among Saudi women in Riyadh, Saudi Arabia (%). Multiple responses were elicited. Pre-op: pre-operative, RE: right eye.**

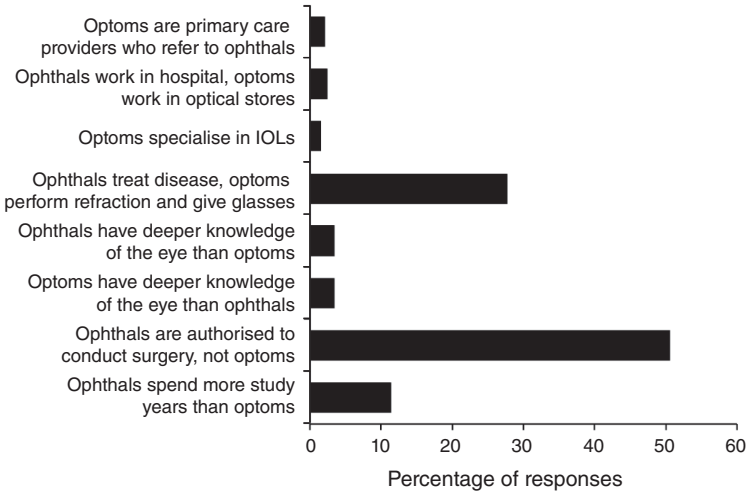


**Figure 2. Differences between ophthalmologists and optometrists as viewed by Saudi women**

for the reasons given in Figure 3. Only 45 respondents (11 per cent) felt that spectacles had positive effect on their daily lives including vision and academic performance improvement, while 33 per cent were concerned about their appearance/social acceptance while wearing spectacles. Of the spectacle wearers (n = 479), 60.1 per cent had problems with incorporating their lens prescriptions into sunglass frames.

On average, respondents believed that the annual cost of spectacles (Saudi Arabian Riyals SR1,429, ~US$380) and CLs (SR1,367, ~US$360) were similar. Further analysis revealed that spectacle users gave lower annual estimates than those who had never used spectacles (SR1,299 $\pm$ 1,228 versus SR1,471 $\pm$ 2,310/year, p = 0.005). By contrast, those with a history of CL wear and those who never tried CLs, gave similar estimates of annual CL cost (SR1,367 $\pm$ 1,228 versus SR1,480 $\pm$ 2,241, p = 0.331).

## Respondents' awareness and attitudes toward the use of CLs for refractive error correction

As shown in Table 2, the majority (88 per cent) were aware that CLs can be used instead of spectacles for correction of refractive error, and 45 per cent had a history of CL wear. Many of the CLs were prescribed by the optometrist (42 per cent) followed by the ophthalmologist (31 per cent) while others (22 per cent) were from unlicensed sources. Spectacle users were 31 times (95% CI 0.99/9.28, p = 0.053) more likely to know that CLs can be used instead of spectacles for correction of refractive errors, compared to non-spectacle users. Figure 4 shows the overall perception of respondents toward CL-related side effects and complications. The fear of allergy, dryness, infection and inflammation with CL use hindered 62 per cent of people from taking up CLs for refractive error correction. Only 31.6 per cent were unaware that coloured CLs can be worn exclusively for fashion. Three in every five female students who used CL for fashion got them without the optometrist or ophthalmologist recommendation.

## Awareness and attitudes of respondents toward refractive surgery

Only a few of the respondents (10 per cent) knew that refractive surgery can be performed to correct refractive errors and reduce or eliminate people's dependency on spectacles. For those who knew, they were more likely to be respondents who were also aware of the possible side effects/complications of CL use (adjusted OR 4.70, 95% CI 1.16/19.02; p = 0.03). When asked to report what they knew about refractive surgery, 40.9 per cent felt the procedure was expensive, 22.4 per cent felt it was 'risky and unreliable', 10 per cent thought it depended on age, six per cent were scared of the post-operative complications, and 5.3 per cent said it causes dry eye. About 12.7 per cent felt the procedure enhanced vision and decreased dependency on spectacles, while the remaining 2.7 per cent listed the different types of refractive surgery procedures available.

Fifty-four respondents (5.1 per cent) had a history of refractive surgery (88.9 per cent were previous CL wearers and 11.1 per cent were spectacle wearers) at the time of this study, and many were dissatisfied with the outcome (Table 2). Lack of information and fear of complications were top on the list for reasons why respondents were reluctant to uptake the different correction methods (Figure 3). At the end of the survey, many of the respondents who had a history of spectacle lens wear indicated interest in CLs (64 per cent) and refractive surgery (11 per cent) and some chose to continue with spectacle lenses (23 per cent)

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| Items | Responses, n (%) |
|---|---|
| 1. Spectacle lens awareness | |
| Have you ever worn spectacles? | |
| Yes | 630 (59.9) |
| No | 422 (40.1) |
| Do you currently use spectacles? | |
| Yes | 496 (45.5) |
| No | 573 (54.5) |
| If you wear spectacles, do you suffer from not being able to use sunglasses (due to blurry vision for not having your prescription in them?)† | |
| Yes | 295 (61.6) |
| No | 184 (38.4) |
| Do you believe that spectacles had (or have in general) limiting effects on your daily life? | |
| Yes | 409 (38.9) |
| No | 643 (61.1) |
| Average annual cost of spectacles, contact lenses in Saudi Riyals; mean (± SD) | 1,429 (±1,855), 1,367 (±1,229) |
| 2. Contact lens awareness | |
| Are you aware that contact lenses can be used instead of spectacles? | |
| Yes | 861 (81.8) |
| No | 191 (18.2) |
| Have you ever worn contact lenses? | |
| Yes | 498 (47.3) |
| No | 554 (52.7) |
| If yes, please mention the average number of wearing† hours per day | |
| < 8 hours/day (part-time) | 233 (48.7) |
| ≥ 8 hours/day (full-time) | 147 (30.8) |
| Wore just once or twice | 93 (8.8) |
| If yes, please mention how long you have been using contact lenses† | |
| < 6 months | 37 (7.4) |
| 6–12 months | 48 (9.6) |
| > 12 months | 272 (54.6) |
| From whom did you obtain your contact lens prescription?† | |
| Optometrist | 197 (41.2) |
| Ophthalmologist | 146 (30.5) |
| Optical technician/others | 155 (32.4) |
| Are you aware of the symptoms of possible contact lens problems and side effects? | |
| Yes | 595 (56.6) |
| No | 457 (43.4) |
| If you wear spectacles but have not had a history of contact lens use, please choose the reason:† | n = 239 |
| Lack of sufficient information | 35 (5.5) |
| Fear of complications/side effects | 146 (23.2) |
| High cost | 24 (3.8) |
| Content with spectacle | 79 (12.5) |
| Others (such as parents' refusal, physicians' advice, busy, not comfortable/not needed/not interested/too young) | 27 (4.3) |

**Table 2. Participant responses to questions on spectacles, contact lenses and refractive surgery awareness. Participants were female students (n = 1,052) in the Riyadh Province.**

for correction of their refractive errors (Figure 4).

## Discussion

The authorities of the Kingdom of Saudi Arabia have prioritised raising public awareness on different health issues and have put in enormous effort toward education and even more effort to improve the population general health.[23] With an increase in the standard of living, people's awareness of the health concerns they encounter in daily living will increase and even more so among educated people who are more interested in the health services they receive. To the best of our knowledge, this is the first study to provide evidence of the general knowledge and perception of Saudi female students toward refractive error correction methods and one of the first in the Middle Eastern region. Undergraduate students were chosen for their high levels of knowledge[18] and high prevalence of CL usage.[24]

In this study, awareness referred to having heard of the topic discussed and did not refer to having a complete/total knowledge of the topic. The respondents demonstrated a high level of general knowledge of refractive error correction methods but the knowledge also varied according to the method being questioned. For instance, respondents had very high knowledge of CLs and refractive surgery-related issues and showed moderate to high knowledge of spectacle lens issues which were better than previous reports.[18,19] By contrast, participants in this study (90 per cent) had better knowledge of the existence of refractive surgery when compared to a previous study which examined knowledge of older people living in rural Saudi Arabia (60–80 per cent), but they also had a fairly poor in-depth knowledge of the purpose for the technique as only 10 per cent knew that the technique corrects refractive error and reduces dependency on spectacles/CLs. Since such in-depth knowledge was not explored in the previous study,[18] both results could not be compared. At the end of the survey, many spectacle and CL users showed interest in refractive surgery for correction of refractive errors.

The study found that approximately half of the respondents had never gone for an eye examination and a similar proportion had only been examined either once or


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| Items | Responses, n (%) |
|---|---|
| Are you aware of coloured contact lenses worn exclusively for cosmetic purposes on normal eyes? | |
| Yes | 332 (31.6) |
| No | 720 (68.4) |
| Have you ever worn such cosmetic contact lenses? | |
| Yes | 415 (39.4) |
| No | 637 (60.6) |
| Who prescribed your cosmetic contact lens?† | |
| Optometrist | 103 (24.8) |
| Ophthalmologist | 46 (11.1) |
| Optical technician | 22 (5.3) |
| Others (self, online, friend/family) | 235 (56.6) |
| Are you aware of the presence of contact lenses which have both refractive correction and cosmetic properties? | |
| Yes | 769 (73.1) |
| No | 282 (26.8) |
| 3. Awareness of refractive surgery procedures | |
| Are you aware of the possibility of refractive surgery in order to improve the eyesight and decrease or eliminate depending on spectacles? | |
| Yes | 944 (89.7) |
| No | 108 (10.3) |
| Have you had such refractive surgery? | |
| Yes | 54 (5.1) |
| No | 998 (94.9) |
| If yes, are you satisfied with the result?† | |
| Yes | 47 (87) |
| No | 7 (13) |
| If you've worn/currently wear spectacles but have not had any refractive surgery, please choose the reason: | |
| Lack of information regarding refractive surgery | 133 (12.6) |
| High cost | 15 (1.4) |
| Fear of side effects/complications | 95 (9.0) |
| Lack of reliable centres to do such surgery | 18 (1.7) |
| Young age | 45 (4.3) |
| Content with spectacles | 18 (1.7) |
| Others | 306 (29.1) |
| If you wear spectacles, which refractive correction are you interested in? (n = 545 responses) | |
| Continuing spectacles | 125 (22.9) |
| Contact lenses | 70 (12.9) |
| Refractive surgery | 350 (62.2) |
| Where the proportions do not add up to 100%, there were some non-respondents. | |
| †Denominators were less than the 1,052 women except where indicated for these sub-group analyses. | |

**Table 2. Continued**

twice in their lifetime. For those who had previously had an eye examination, many were seen by an ophthalmologist, but only a few (28 per cent) correctly identified the difference between an optometrist and ophthalmologist. Spectacle lens users or students who were studying a health-related course were more likely to correctly distinguish the ophthalmologist from the optometrist. Such lack of awareness/confusion among this cohort on the difference between professions which was also recently noted among older adults in the Kingdom,[18] could be attributed in part to the disproportionate representation of eye-care practitioners in the Kingdom (for example, the optometrist-to-population ratio was 1:48, 561 in 2017) and the fact that majority of the eye-care providers in the Kingdom, including opticians, work in optical stores and are all involved with vision testing.[25] In addition, the respondents in this study were mostly from non-health colleges (70 per cent), which may have also influenced their knowledge level. Both the optometry and medical schools in the Kingdom can leverage on the opportunity presented during the open days to educate prospective students and common first year students on the roles of the different health professions.

The three professions (ophthalmologists, optometrists, and opticians) are all involved with the examination of the eyes, but differ in their levels of training and in what they can diagnose and treat in Saudi Arabia. According to the American Academy of Ophthalmology,[26] an ophthalmologist is a medical doctor who has completed college and at least eight years of additional medical training. An ophthalmologist is licensed to practise medicine and surgery and can also diagnose and treat all eye diseases, perform eye surgery and prescribe and fit spectacles and CLs for correction of vision problems. An optometrist is a primary health care professional who provides vision care including sight testing, corrects vision problems and can diagnose, treat, and manage vision changes. An optometrist is not a medical doctor but receives a Doctor of Optometry (OD) degree (at least in the current Saudi Arabian system, Nigeria, Canada and the USA), after completing four years of optometry school, preceded by three or more years of college. In some countries an optometrist receives a Master's degree as in some UK and Australian schools or a Bachelor's degree in most countries. An optician is trained to design, verify and fit spectacle lenses, frames, CLs, and other devices that correct eyesight but, unlike optometrists and ophthalmologists, they are not permitted to diagnose or treat eye diseases.

Contrary to a previous study on presbyopes,[18] there were more spectacle users in this study (60 per cent versus eight per cent) and more people believed that spectacles made their daily and academic life easier.[18] Similar to previous studies,[27,28] physical appearance and other people's perceptions of spectacles were the main hindrances to their uptake. Low uptake of spectacles, even among those who need

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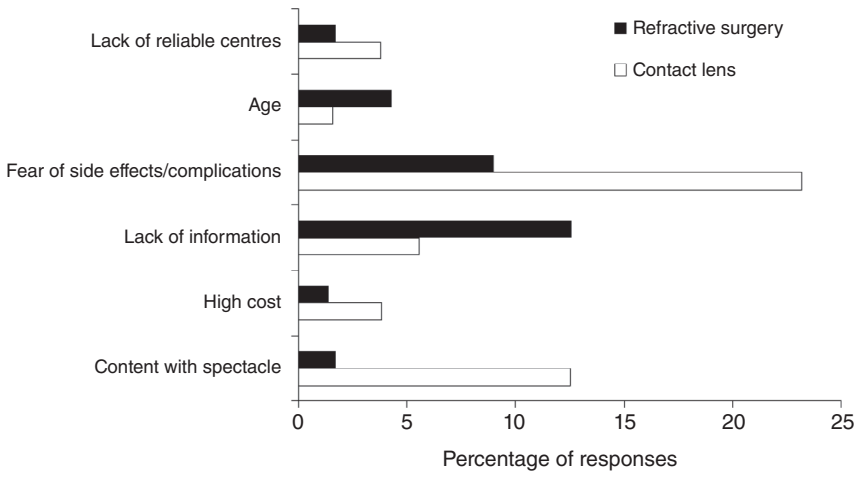


**Figure 3. Concerns of Saudi women regarding refractive surgery and contact lens uptake in Riyadh**

them,[29–31] as well as poor quality of refractive services,[29] has been noted in other populations. Cost of correction which was cited by many participants in previous studies,[27,28] seems to be less important to the Saudi female students who were also not aware of the importance of regular eye checks in preventing the complications of uncorrected refractive error. A significant proportion of the Saudi female students either never had an eye examination or did so just once or twice in their lifetime. This is very concerning owing to the epidemic proportions of myopia in this region.[32] These students may go uncorrected and develop vision loss, which could have been prevented by a simple eye examination. In a small study of 193 people aged 12 years and over in Iran, a similar observation was made.[19] In 2006, the World Health Organization reported that a simple sight examination and spectacles could dramatically change the lives of the 150 million people with poor vision.[33] This finding strongly suggests that the population, particularly female university students, need to be educated on the importance of regular eye checks, and school-based vision screenings are needed for early detection/prevention of vision loss, even as many cited a drop in vision as the motivating factor for seeking ocular examination.

Regarding CLs, respondents demonstrated an overall high level of knowledge about the possible complications and the majority knew that CLs including coloured ones, can be used to correct vision problems. In a previous study, respondents showed very poor knowledge of CL use for vision correction with a staggering 80.3 per cent unaware.[19] Approximately 32.4 per cent of the respondents in this study used CLs without consultation with an eye-care practitioner and this was similar to a previous report from a study conducted among students in Riyadh (38.7 per cent)[24] but much lower than another report among students in Mecca (69 per cent).[34] Spectacle lens wearers who had no history of CL use stated they were more afraid of the complications/side effects and had insufficient information on CL-related issues. Knowledge of these information gaps between regions is important for health promotion officers in Saudi Arabia when designing ocular health promotion programs suited for university students. Practitioners need to address the worries of their patients during consultations and educate eligible CL users on proper handling, care and general hygiene as ways of preventing possible complications.

Similar to a study conducted among medical students in Brazil,[4] many students in this study have heard about refractive surgery, but only five per cent as compared to

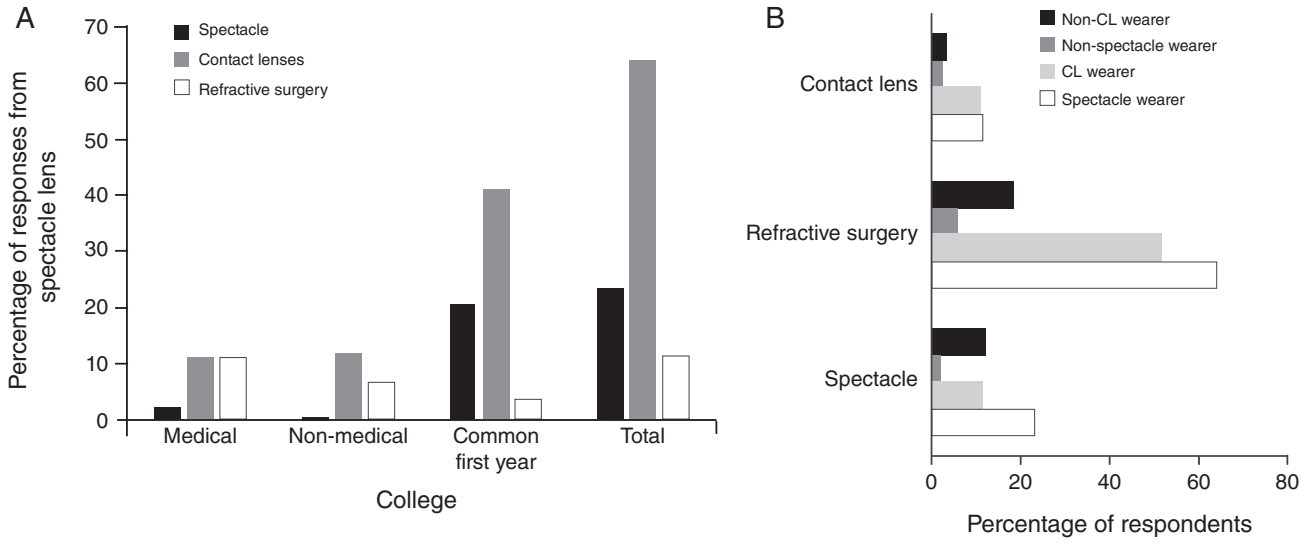


**Figure 4. Preference for refractive correction method among Saudi women in Riyadh. A: By college of study for spectacle lens users and B: by previous method of correction.**


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1.9 per cent in the previous study,[4] had experienced the procedure. The level of awareness was higher than previously reported in other developing countries[19,35] and in this study, people were more likely to uptake refractive surgery if they knew the possible complications of CLs. Reluctance to uptake refractive surgery for correction of vision problems was attributed to a lack of information on the procedure, particularly on the possible complications or benefits thereof. At the end of the survey, spectacle lens users (64 per cent) and even many CL wearers (51 per cent) were more interested in refractive surgery than other techniques, which could be attributed to an increased knowledge and awareness about the technique.

In conclusion, this study demonstrates lack of awareness among female university students in Saudi Arabia about the role of the optometrist and ophthalmologist in eye care. Despite the high level of awareness and knowledge about refractive error correction methods demonstrated by female university students in Saudi Arabia, many remain uncorrected and have either never had an eye examination or sparingly had one or two eye examinations in their lives. This may represent the proportion who could go undetected and possibly lose their vision. Although the study involved only a very specific demographic and the results may not be applicable to the public in general, the findings showed the need for strategies including school-based vision screening and eye-health promotion programs to address the gap in eye-care service awareness and enable early detection, treatment and prevention of avoidable vision loss. In addition, it is essential that practitioners and public health officers provide detailed information to patients and the community about refractive error conditions and the available correction options as well as the dire consequences of uncorrected refractive errors. This can be done through educational campaigns in the media, university newsletters and so on. However, addressing some of the beliefs and concerns of the students in this study may encourage people to seek the medical help they very much need.

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