Medical Science

pISSN 2321–7359; eISSN 2321–7367

Preference and attitude towards refractive errors correction methods among Qassim University students

Abdulmajeed Alharbi[1], **Norah Motlg Alharbi**[2], **Faisal Fahad Almishali**[2], **Shoug Saleh Alnasyan**[2], **Tariq Ayed Alrashidi**[2], **Khozama Badr Alaql**[2], **Mansourah Fayez Bedaiwi**[2], **Asma Abdullah Alsohaibani**[2]

To Cite:
Alharbi A, Alharbi NM, Almishali FF, Alnasyan SS, Alrashidi TA, Alaql KB, Bedaiwi MF, Alsohaibani AA. Preference and attitude towards refractive errors correction methods among Qassim University students. *Medical Science* 2023; 27: e106ms2874.
doi: https://doi.org/10.54905/disssi/v27i132/e106ms2874

Authors' Affiliation:
[1]Assistant professor, Department of ophthalmology, College of medicine, Qassim University, Saudi Arabia
[2]College of Medicine, Qassim University, Saudi Arabia

Contact List

Abdulmajeed Alharbi	hrbyad@qu.edu.sa
Norah Motlg Alharbi	Norhmotlg@gmail.com
Faisal Fahad Almishali	Ffa41111@gmail.com
Shoug Saleh Alnasyan	snossyan@gmail.com
Tariq Ayed Alrashidi	dr.tareq.ucm@gmail.com
Khozama Badr Alaql	kba1419@outlook.com
Mansourah Fayez Bedaiwi	MANSO3610@GMAIL.COM
Asma Abdullah Alsohaibani	asmaabdullah.sa1@gmail.com

Peer-Review History
Received: 06 February 2023
Reviewed & Revised: 09/February/2023 to 19/February/2023
Accepted: 20 February 2023
Published: 22 February 2023

Peer-review Method
External peer-review was done through double-blind method.

URL: https://www.discoveryjournals.org/medicalscience

ABSTRACT

Background: The prevalence of refractive error is considered to be a significant health issue. It can lead to lifelong negative consequences such as unstable emotional developments and poor academic performance. It can also affect people's quality of life. This research aims to assess the knowledge and preference towards refractive error correction methods among the students at Qassim University. *Methodology:* The study is cross-sectional, online questionnaire-based study. Sample was collected from Qassim University students in Qassim region in Saudi Arabia. Data was collected from the online questionnaire platform. Questionnaire was designed by Google forms. Data was collected in excel sheet then was transferred into SPSS software for statistical analysis. *Results:* A total of 1310 students responded to the survey tool. 861 of the participants had refractive error, 722 of them had myopia and spectacles were the most preferred method of correction (72.3%). Refractive surgery was known to 660 of the participants and 454 of them were willing to undergo it. Fear of complications is the most common reason for not having the procedure (57.1%). *Conclusion:* Refractive surgery is a frequently performed procedure, but knowledge about the complications of this procedure is poor among students at Qassim University. We recommend that refractive surgical methods be introduced by physicians in order to educate students on the safety and effectiveness of this procedure.

Keywords: Refractive errors correction, preference and attitude, Spectacles, World health organization.

1. INTRODUCTION

A refractive error (RE) is a common type of vision problem. It happens when the eye is unable to clearly focus on images from the outside world. Refractive errors cause eye strain, which can be severe enough to cause visual impairment. The most common types of RE are myopia, hyperopia and

astigmatism (WHO, 2013). The prevalence of RE in Saudi Arabia, varies from region to region. For example, in a study conducted among medical students at Qassim University, the prevalence was 48.8%, the same prevalence was also found in Jazan University study, while in the Riyadh region, the prevalence of myopia was 48.7% (Al-Rashidi et al., 2018; Almudhaiyan et al., 2020; Abuallut et al., 2020).

There are many different types of RE correction, including spectacles, which are simple and safe and contact lenses (Al-Osaif & Aldairi, 2022; Banjar et al., 2023), which can cause infection if not used properly. However, there is variety of surgical options for RE correction, including LASIK (laser in-situ keratomileusis), which is the most frequently performed method (Victor et al., 2005). According to a study conducted in Saudi Arabia's western region, 93.5 % believed they have the knowledge about refractive surgery, with family and friends being the primary sources of information and the majority believe it is the preferred method of refractive correction. Moreover, the majority of them believe that the reasons for not undergoing refractive surgery are the high cost and the risk of complications (Alghamdi et al., 2019).

Spectacles were the most popular in a study done in Nepal, with 87.3% of participants wearing them. Refractive surgery was unknown to 76% of those in the study. According to the findings of the study, people who seek refractive surgery correction for moderate-to-high refractive error types prefer it over glasses for life style and cosmetic reasons (Giri et al., 2020). Our aim in this study is to determine the preference and attitude of RE correction methods among students at Qassim University in the period from July 2022 to September 2022 in Qassim region, KSA.

2. MATERIALS AND METHODS

Study design and Setting

Descriptive cross-sectional study conducted from July 2022 to September 2022 using a validated 16-item self-administrated questionnaire designed to survey students' preference and attitude towards refractive errors correction methods. This study was conducted among students in different specialties and levels in Qassim University, Saudi Arabia.

Sample size

Formula was used for calculating the adequate sample size in prevalence study is

$$n = (z)^2 \, p \, (1 - p) / d^2$$

Where:

n= Sample size.

z= Confidence level, which is 1.96.

p= Expected prévalence, which is 50%.

d= Absolute error, which is 5%.

The sample size is 384.

Sampling technique (with inclusion and exclusion criteria)

This study was conducted using the snowball sampling technique with the inclusion criteria of students who study at Qassim University, agree to participate and who are 18 years old or above either male or female. Students who do not study at Qassim University, students who have trauma or injury to the globe or who have other ocular disorders and students who are aged less than 18 years old are excluded.

Data collection methods

We collected the data using a self-administrated questionnaire using Google form. With high social media usage among the population in Qassim region, the link of the survey was distributed to respondents, via WhatsApp groups, Telegram and Twitter. The questionnaire was developed by (Attitude toward refractive error surgery and other correction methods: A cross-sectional study) (Alhibshi et al., 2021). We obtained the consent from the study's author, the questionnaire was in the English language, we translated it from English to Arabic with slight modifications, a few questions were added to match the study objectives then validation was done by pilot test. The survey consisted of 16 questions which included three parts. First part is about the demographics including age and gender. Second part is about the knowledge of refractive surgeries, the preferred correction method and the attitude towards the different methods. Third part is about the relationship between demographic factors of the participants and their preference considering correcting refractive errors. The ethical approval was taken from the subcommittee of Health Research Ethics, Deanship of Scientific Research, Qassim University, we obtained the inform consent from each participant

before filling the questionnaire. A clear explanation of the study's purpose was given to the participants and the questionnaire did not contain any personal information. Answers were not able to be tracked individually.

Plan for managing and analyzing data

Data were identified initially and then coded in the database excel sheet using a unique identification number. The data were stored on a password-protected laptop with PI and CI; and all the data were maintained confidential. Only the research team had access to the database for analysis purposes. The publication presents summary statistics and no identifying information used. We entered the date collected from the questionnaire into the Statistical Package for Social Sciences (SPSS, version 25.0). Various descriptive statistics were used to calculate frequencies, means and standard deviation. A chi-square test was used to compare the categorical variables.

3. RESULTS

In this study, we were able to collect data from 1310 students at Qassim University. Among the sample, 82.5% of them were females and 67.9% were aged between 21-30 years old. The prevalence of refractive errors among the participants was 65.7% (N=861). Females reported significantly higher rate of refractive disorders than males where 67.3% of females reported refractive disorder compared with 58.5% of males (P=0.011) while no significant difference was found between different age groups (P=0.508) (Table 1). The leading cause of refractive error was myopia followed by astigmatism and finally hyperopia with (722/861, 83.9%), (276/861, 32.1%), (60/861, 7.0%) respectively.

Table 1 Demographic factors of the participants and its association with refractive disorder

		Total		Refractive disorder				
				Yes		No		
		N	N%	N	N%	N	N%	P-value
Gender	Male	229	17.5 %	134	15.6%	95	21.2%	0.011*
	Female	1081	82.5 %	727	84.4%	354	78.8%	
Age	18-20	391	29.8 %	256	29.7%	135	30.1%	0.508
	21-30	890	67.9 %	583	67.7%	307	68.4%	
	>31	29	2.2 %	22	2.6%	7	1.6%	

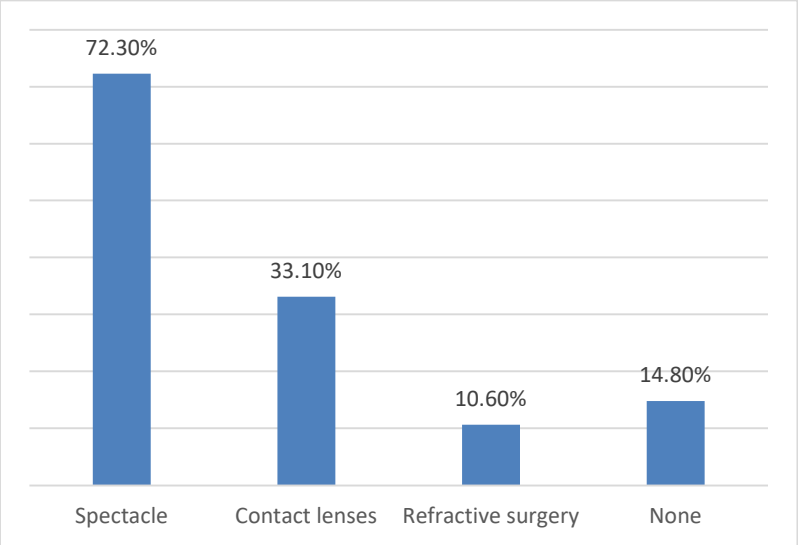

Figure 1 Type of correction method

Among 861 patients with different refractive errors, spectacle was the most common correction method used (72.3%), followed by contact lenses in 33.1 % while 10.6% had previously undergone refractive surgery and 14.8 % reported never using correction methods for their refractive errors (Figure 1).

Among the participants; 373 out of 861 of the participants reported being comfortable with using spectacles (43.3 %). The main reason for this comfortable state was ease of use which reported by (353/373, 95.4 %) followed by maintenance free and cost which reported by almost quarter of the students. On the other hand, limiting effects of spectacles on daily life was the main reason of being not comfortable with spectacles (293/488, 61.8%) following by cosmetic reasons (282/488, 59.5%). Moreover, 33.9% of the students reported that they were comfortable with using contact lenses which represented 56.5% of those reported using contact lenses (285/504, 56.5%). The cosmetic purpose and comfortable effect were the main reasons for state of comfortable using contact lenses. Moreover, 76.7% of the patients with refractive errors reported being aware of the surgical procedure for refractive error correction (660/861) where 69.5% of those reported willing to undergo that procedure (454/660). The main reason for refrain to undergo surgical procedures including fear of complications (101/199, 57.1%), cost of the procedure (76/199, 42.9%) and chance that spectacles may be necessary after the surgery (54/199, 30.5%) (Table 2).

Table 2 Preference of students toward different correction methods

	Count	Percent
Are you comfortable with spectacles?		
No	488	56.7%
Yes	373	43.3%
If yes, why are spectacles comfortable to you?		
Ease of use	353	95.4%
Maintenance free	95	25.7%
Cost	83	22.4%
If no, why are spectacles not comfortable?		
Require more maintenance	119	25.1%
Limiting effects on daily life (e.g., swimming)	293	61.8%
Cosmetic reasons	282	59.5%
Not comfortable	67	14.1%
Are you comfortable with using contact lenses?		
Yes, I am comfortable using contact lenses	285	33.9%
No, I have tried contact lenses and do not find them comfortable	219	26.1%
I have not used contact lenses but would consider doing so in the future	159	18.9%
I have not used contact lenses and would not consider doing so in the future	177	21.1%
If yes, why are you comfortable with contact lens use?		
Cosmetic purposes	214	75.9%
Maintenance	22	7.8%
Comfortable	191	67.7%
Are you aware of surgical procedure for refractive error correction?		
No	201	23.3%
Yes	660	76.7%
If yes, would you be willing to undergo that procedure?		
No	199	30.5%
Yes	454	69.5%
If no, state the most likely reason		
Cost of procedure	76	42.9%
Fear of complications	101	57.1%
Lack of information	30	16.9%
Chance that spectacles may be necessary in future	54	30.5%

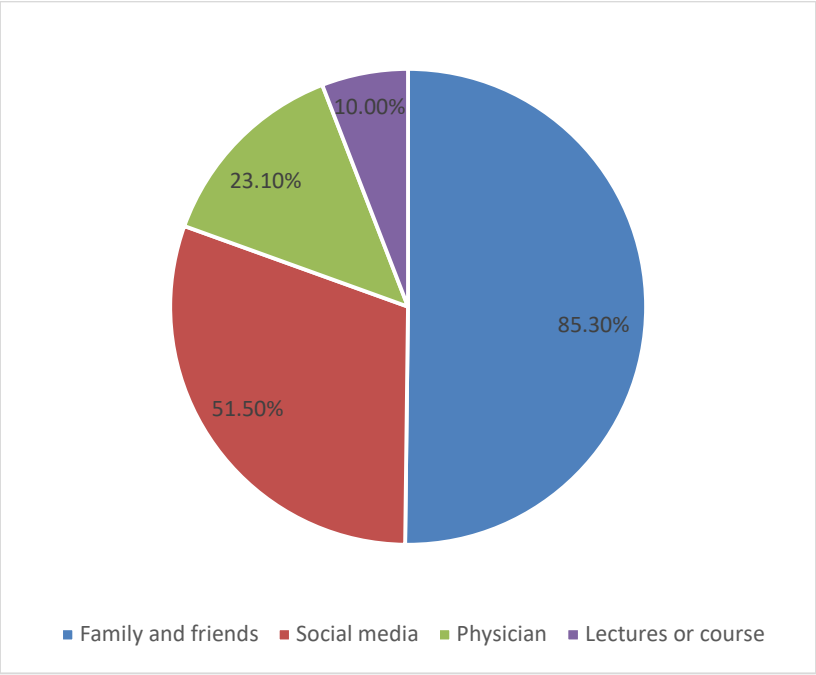

Figure 2 Source of information toward surgical procedure of refractive errors

Moreover, we found that family and friends was the main source of information (85.3%) followed by social media in 51.5% of the participants while physicians were the source of information for less than quarter of the sample (23.1%) and 10% took their information from lectures or courses (Figure 2). Moreover, 25.9% of the participants thought that surgical procedures are dangerous while 46% of them did not know the degree of the complications while 41.6% thought that they are simple and 12.4% thought that they are advances. Moreover, 66.7% of the participants thought that vision weakness comes back after a period of laser procedures.

Moreover, we found that gender of the participants has a significant impact on their preferences. Higher percent of male students thought that spectacles were comfortable than females (53.7% of male compared with 41.4% of females, P=0.008) while female students were more comfortable with contact lenes than males (37.7% vs 12.7%, P=0.000) where most of the male students reported never using contact lenses. Moreover, females showed higher willing to undergo surgical refractive correction procedures than males (71.3% of females compared with 59.8% of male, P=0.02) however, no difference between gender considering awareness of the surgical procedures (P=0.873). Moreover, age did not seem to have a significant effect on the preference however, it seem that older participants were being comfortable with spectacles than younger participants while younger participants were more comfortable with contact lenses (Table 3).

Table 3 The relationship between demographic factors of the participants and preference considering correcting refractive errors

	Gender					Age				
	Male		Female		P-Value	< 20		> 20		P-Value
Are you comfortable with spectacles?										
No	62	46.3%	426	58.6%	0.008*	154	60.2%	334	55.2%	0.180
Yes	72	53.7%	301	41.4%		102	39.8%	271	44.8%	
Are you comfortable with using contact lenses?										
Yes, I am comfortable using contact lenses	16	12.7%	269	37.7%	0.000*	89	35.9%	196	33.1%	0.022*
No, I have tried contact lenses and do not find them comfortable	16	12.7%	203	28.4%		48	19.4%	171	28.9%	
I have not used contact lenses but would consider doing so in the future	35	27.8%	124	17.4%		57	23.0%	102	17.2%	
I have not used contact lenses	59	46.8%	118	16.5%		54	21.8%	123	20.8%	

and would not consider doing so in the future										
Are you aware of surgical procedure for refractive error correction?										
No	32	23.9%	169	23.2%	0.873	67	26.2%	134	22.1%	0.202
Yes	102	76.1%	558	76.8%		189	73.8%	471	77.9%	
If yes, would you be willing to undergo that procedure?										
No	41	40.2%	158	28.7%	0.02*	48	25.7%	151	32.4%	0.091
Yes	61	59.8%	393	71.3%		139	74.3%	315	67.6%	

4. DISCUSSION

Refractive errors are considered one of the leading causes of loss of vision worldwide (Flaxman et al., 2017). Therefore, it has been the subject of various studies to determine its prevalence in different populations, the risk factors involved and possible methods of correction. The preference of patients toward different management methods of their medical condition is considered very important in preparing for this management to ensure the adherence to treatment (Jimmy and Jose, 2011; Fernandez-Lazaro et al., 2019). Understanding the reasons for using these methods would help in preparing proper management of such medical condition. There is an increasing incidence of errors of refraction in the younger age individuals which increase the social and economic burden of the affected individuals globally as reported by Ghaderi et al., (2018) and Lou et al., (2016), this study was conducted among 1310 students in Qassim university, Saudi Arabia and the data showed that 65.7% of the students reported having refractive errors where most of them were affected by myopia followed by astigmatism and hyperopia. This is higher than reported in a previous study conducted among medical students at Qassim University and showed a prevalence of 48.8% (Al-Rashidi et al., 2018). This difference between the studies showed the significant increase in the prevalence of refractive errors in 5 years interval in the same population. Moreover, another study conducted in Arar city, Saudi Arabia showed that the prevalence of refractive errors among adults was 45.8% where myopia was the most common type followed by hyperopia and stigmatism (Parrey and Elmorsy, 2019). In a study conducted at Aljouf university, Saudi Arabia, shows a prevalence of refractive errors of 83.1% where 74.13% of them were myopic and 53.73% were astigmatic (Alruwaili et al., 2018). Moreover, a previous study conducted among adolescents at King Abdul-Aziz Medical city, Riyadh, Saudi Arabia in 2010 reported a significantly lower prevalence of 9.8% where 4.5% presented as myopia, 6.5% as astigmatism, 1.5% as hyperopia and 0.65% as amblyopia (Rowaily and Alanizi, 2010). In Al Riyadh, another study found that 55.5% of the adolescents had some form of refractive errors where myopia was the most common type (53.3%) followed by hyperopia (2.2% while 15% of them had stigmatism (Alsaqr et al., 2018). Moreover, another study conducted among medical students at Imam Abdulrahman Bin Faisal University showed that 47.9% of the students participating in this study had a degree of myopia (Alsaif et al., 2019). International studies showed different results considering prevalence of refractive errors. Our results were higher than reported in some previous studies including study conducted in Malaysia showed a prevalence of refractive errors among university students by 32.24% (Gopalakrishnan et al., 2011), while Salih, (2018) showed that 33% of the students in Al-Mustansiriya Medical College, Iraq had refractive errors. Moreover, our results were higher than reported in two studies conducted in India (48.3%, 47.4%) (Patel et al., 2019; Kshatri et al., 2016), Nepal (51.4%) (Rizyal et al., 2019) and Pakistan (47%) (Parveen et al., 2016).

Spectacles, contact lenses, refractive surgery are available choices for refractive errors correction (Ayyappan et al., 2019). In the current study, 72.3% of the participants use spectacle while 33.1% use contact lenses in order to correct their refraction errors where 10.6% of them reported that they performed a refractive surgery. This indicates that the growing popularity of contact lenses and refractive surgery has not affected the use of eyeglasses, the most common form of refractive correction (Dandona et al., 2002; Holden et al., 2000). Considering preferences of patients toward different correction methods, we found that 43.3% of the participants were comfortable with spectacles while 33.9% were comfortable with contact lenses and 69.5% had the willing for undergoing refractive surgery. The main reason for this comfortable state was ease of use while limiting effects of spectacles on daily life was the main reason of being not comfortable with spectacles. The cosmetic purpose and comfortable effect were the main reasons for state of comfortable using contact lenses. Our results were slightly similar to the results of previous study which showed that more than half of the students found glasses comfortable where the main reason was ease of use while the main cause for glasses discomfort was their limiting effect on daily activity, being not aesthetically pleasing and required more maintenance (Alhibshi et al., 2021). Moreover, another study done in Saudi Arabia showed that most of the participants believed that glasses are easily accessible and increased their quality of life (Alghamdi et al., 2019). Many previous studies showed similar hindrances to glasses wear as our results stating that glasses were a hassle and did not appeal to the participants cosmetically (Fylan et al., 2005;

Yasmin and Minto, 2007). Moreover, many studies showed similar results considering that comfort with contact lenes was attributed with cosmetic reasons, ease of use and convenience (Kanonidou et al., 2011; Lee et al., 2000; Unnikrishnan and Hussain, 2009).

The prevalence of having refractive surgery reported in this study was similar to what reported by previous studies (Alghamdi et al., 2019; Alhibshi et al., 2021). The low rate of performing refractive surgeries among our population could be related to the high cost of the surgery where 42.9% of those participants reported not welling to undergo the operation reported the cost as the barrier for not performing the surgery as well as fear from complications and fear from need for spectacles after the surgery. This is similar to the results of Alghamdi et al., (2019) who showed that 43.2% of the students reported that the main barrier preventing them from performing the surgery was the high cost followed by fear of complications and lack of information. Moreover, in our study, 69.5% of the patients reported welling to perform the surgery which is higher than reported by Puri and Elangovan, (2016) at Meenakshi Medical College, India which showed that 65.92% of the participants showed no desire to perform the surgery mainly because of fearing from complications. Moreover, only 25.9% of the participants thought that refractive surgery is dangerous and 12.4% thought that it causes advances complications.

Furthermore, 76.7% of the patients were aware about the surgical procedure for refractive error correction which is better than reported in previous studies in India that showed that 64% of the participants did not know that refractive surgery able to improve their vision (Usgaonkar and Tambe, 2018) while other studies showed better awareness including study of Puri and Elangovan, (2016) which showed that 92.51% of the medical students were aware of refractive surgery and study of Filho et al., (2013) showed that 85.7% of the medical students have heard of the refractive surgery.

Moreover, we found in this study that there is a difference between genders considering their preference toward different correction methods where male preferred glasses and female preferred contact lenses while higher percent of females showed welling to undergo refractive surgeries than male. This could be related with cosmetic benefits of both of contact lenses and surgery where females would be highly interested. This was reported is many studies which showed that females tend for using contact lenses than males mainly because of cosmetic purpose (Berenson et al., 2019; Irfan et al., 2019; Alharbi and Sarriyah, 2019).

This study had some limitations including the significantly unequal male to female ratio where females were more willing to participate in the study. Moreover, the depending on self-reported questionnaire to assess the prevalence of medical condition could lead to some bias where some individuals may not know that they had refractive errors and other may overestimate their condition. Therefore, adding improvement to the study by depending on clinical examination in diagnosis of refractive errors could increase the significance of the study.

5. CONCLUSION

In conclusion, there is an increasing rate of having refractive errors among university students at Qassim University. Moreover, the study showed that many students had good knowledge considering refractive surgery however most of this information was from family and friends. The fear of complications was the main deterrent to not undergoing refractive surgery, so we advised that medical professionals introduce refractive surgical correction techniques and give students more information about the safety and effectiveness of these surgeries.

Acknowledgement

We appreciate Qassim university students who participated and provided samples for the investigation.

Authors' contributions

All Authors contributed equally to study conception and design, data collection and presentation, supervision, literature review, writing manuscript, critical revision and final approval for publication.

Ethical Approval

We sought ethical approval from the Committee of Research Ethics, Deanship of Scientific Research, Qassim University, ethical approval code (21-22-13).

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

1. Abuallut I, Alhulaibi A, Alyamani A, Almalki NM, Alrajhi AA, Alharbi AH, Mahfouz MS. Prevalence of refractive errors and its associated risk factors among medical students of Jazan University, Saudi Arabia: A cross-sectional study. Middle East Afr J Ophthalmol 2020; 27(4):210. doi: 10.4103/meajo.MEAJO_240_20
2. Alghamdi A, Alzahrani M, Alhamami A, Altalhi AK, Alkhathami AM, Alosaimi BM, Bukhari TA, Turkistani AK, Al-Qurashi QZ, Basharahil SS, Althomali TA. A study of general population awareness about refractive surgery in the Western region of Saudi Arabia. Int J Med Dev Ctries 2019; 3(0):849-854. doi: 10.24911/IJMDC.51-1562241479
3. Alharbi AJ, Sarriyah JFA. Beliefs, attitude and knowledge of contact lens wear and care among Saudi Arabia population. Clin Diagn Pathol 2019; 3(1). doi: 10.15761/CDP.1000134
4. Alhibshi N, Kamal Y, Aljohani L, Alsaeedi H, Ezzat S, Mandora N. Attitude toward refractive error surgery and other correction methods: A cross-sectional study. Ann Med Surg 2021; 72:103104. doi: 10.1016/j.amsu.2021.103104
5. Almudhaiyan T, Alhamzah A, Al-Shareef M, Alrasheed A, Jaffar R, Alluhidan A, Al-Hazazi M, Aldebasi T. The prevalence of refractive errors among Saudi adults in Riyadh, Saudi Arabia. Saudi J Ophthalmol 2020; 34(1):30. doi: 10.4103/1319-4534.301297
6. Al-Osaif N, Aldairi W. Habits of contact lenses use and the associated outcomes among medical students, King Faisal University, Alahsaa, Saudi Arabia. Medical Science, 2022, 26, ms124e2153. doi: 10.54905/disssi/v26i122/ms124e2153
7. Al-Rashidi SH, Albahouth AA, Althwini WA, Alsohibani AA, Alnughaymishi AA, Alsaeed AA, Al-Rashidi FH, Almatrafi S. Prevalence refractive errors among medical students of Qassim University, Saudi Arabia: Cross-sectional descriptive study. Open Access Maced J Med Sci 2018; 6(5):940-943. doi: 10.3889/oamjms.2018.197
8. Alruwaili WS, Alruwaili MS, Alkuwaykibi MK. Prevalence and awareness of refractive errors among Aljouf University medical students. Egypt J Hosp Med 2018; 70(1):29-32. doi: 10.12816/0042958
9. Alsaif BA, Aljindan MY, Alrammah HM, Almulla MO, Alshahrani SS. Refractive errors among Saudi college students and associated risk factors. Clin Ophthalmol 2019; 13:437-443. doi: 10.2147/OPTH.S193213
10. Alsaqr A, Abu-Sharha A, Fagehi R, Almutairi A, Alosaimi S, Almalki A, Alluwaymi A. The visual status of adolescents in Riyadh, Saudi Arabia: A population study. Clin Ophthalmol 2018; 12:965-972. doi: 10.2147/OPTH.S162319
11. Ayyappan JP, Ismail G, Mohanraj K. Correction of refractive error: Adolescents' choice. Texila Int J Public Health 2019; 7(2):22-28. doi: 10.21522/TIJPH.2013.07.02.Art004
12. Banjar TA, Alosaimy RA, Qashgry EI, Almalki RA, Alduais RF, Alharthi AA, Bamahfouz AYA. Practices and awareness toward contact lens wearing and care post-COVID-19 pandemic: A cross-sectional study. Medical Science 2023; 27: e3ms2675. doi: 10.54905/disssi/v27i131/e3ms2675
13. Berenson AB, Hirth JM, Chang M, Merkley KH. Knowledge and use of cosmetic contact lenses among reproductive-age women. J Womens Health (Larchmt) 2019; 28(3):403-409. doi: 10.1089/jwh.2018.7358
14. Dandona R, Dandona L, Kovai V, Giridhar P, Prasad MN, Srinivas M. Population-based study of spectacles use in southern India. Indian J Ophthalmol 2002; 50(2):145-155.
15. Fernandez-Lazaro CI, García-González JM, Adams DP, Fernandez-Lazaro D, Mielgo-Ayuso J, Caballero-Garcia A, Moreno Racionero F, Córdova A, Miron-Canelo JA. Adherence to treatment and related factors among patients with chronic conditions in primary care: A cross-sectional study. BMC Fam Pract 2019; 20(1):132. doi: 10.1186/s12875-019-1019-3
16. Filho ARG, Aquino NMTD, Pacheco EBDA, Oguido APMT, Casella AMB. Conhecimento em cirurgia refrativa entre estudantes de medicina da Universidade Estadual de Londrina. Rev Bras Oftalmol 2013; 72(3):172-177. doi: 10.159 0/S0034-72802013000300006
17. Flaxman SR, Bourne RRA, Resnikoff S, Ackland P, Braithwaite T, Cicinelli MV, Das A, Jonas JB, Keeffe J, Kempen JH, Leasher J, Limburg H, Naidoo K, Pesudovs K, Silvester A, Stevens GA, Tahhan N, Wong TY, Taylor HR. Global causes of blindness and distance vision impairment 1990–2020: A systematic review and meta-analysis. Lancet Glob Health 2017; 5(12):e1221-e1234. doi: 10.1016/S2214-109 X(17)30393-5
18. Fylan F, Grunfeld EA, Turvey A, Desallais J. Four different types of client attitudes towards purchasing spectacles in optometric practice. Health Expect 2005; 8(1):18-25. doi: 10. 1111/j.1369-7625.2004.00309.x

19. Ghaderi S, Hashemi H, Jafarzadehpur E, Yekta A, Ostadimoghaddam H, Mirzajani A, Khabazkhoob M. The prevalence and causes of visual impairment in seven-year-old children. Clin Exp Optom 2018; 101(3):380-385. doi: 10.1111/cxo.12646
20. Giri P, Bhandari G, Sah R. Knowledge and preference for refractive surgery and preferred methods of refractive correction among patients with significant refractive errors attending Bharatpur Eye Hospital, Nepal. J Nobel Med Coll 2020; 9(1):32-35. doi: 10.3126/jonmc.v9i1.29488
21. Gopalakrishnan S, Prakash MVS, Ranjit KJ. A study of refractive errors among medical students in AIMST University, Malaysia. Indian Med J 2011; 105:365-367.
22. Holden BA, Sulaiman S, Knox K. The challenge of providing spectacles in the developing world. Community Eye Health 2000; 13(33):9-10.
23. Irfan R, Memon RS, Shaikh MY, Khalid I, Shakeel N, Tariq E. Knowledge and attitude of youth towards contact lenses in Karachi, Pakistan. J Glob Health Rep 2019; 3. doi: 10.29 39 2/joghr.3.e2019042
24. Jimmy B, Jose J. Patient medication adherence: Measures in daily practice. Oman Med J 2011; 26(3):155-159. doi: 10.5001 /omj.2011.38
25. Kanonidou E, Chatziralli IP, Praidou A, Konidaris V. Contact lens usage characteristics among young individuals and their perception regarding future refractive surgery. Graefes Arch Clin Exp Ophthalmol 2011; 249(2):307-308. doi: 10.1007/s00417-010-1386-x
26. Kshatri J, Panda M, Tripathy R. Prevalence, progression and associations of corrected refractive errors: A cross-sectional study among students of a Medical College of Odisha, India. Int J Community Med Public Health 2016; 3(10):2916-2920. doi: 10.18203/2394-6040.ijcmph20163383
27. Lee YC, Lim CW, Saw SM, Koh D. The prevalence and pattern of contact lens use in a Singapore community. CLAO J 2000; 26(1):21-25.
28. Lou L, Yao C, Jin Y, Perez V, Ye J. Global patterns in health burden of uncorrected refractive error. Invest Opthalmol Vis Sci 2016; 57(14):6271. doi: 10.1167/iovs.16-20242
29. Parrey MUR, Elmorsy E. Prevalence and pattern of refractive errors among Saudi adults. Pak J Med Sci 2019; 35 (2). doi: 10.12669/pjms.35.2.648
30. Parveen N, Haasan SH, Rehman J, Shoukat U. Prevalence of myopia and its associated risk factors in local medical students. Quarterly Medical Channel 2016; 21(4):2015-2047.
31. Patel D, Desai R, Ramavat M. Prevalence of refractive errors and determinants of myopia among students in GMERS Medical College, Patan, Gujarat, India. Natl J Physiol Pharm Pharmacol 2019; 9(7):652-656. doi: 10.5455/njppp.2019.9.051 7514052019
32. Puri SK, Elangovan S. Perception of refractive surgery among undergraduate medical students and their preferred method of refractive correction. Int J Res Med Sci 2016; 4(4): 1031-1034. doi: 10.18203/2320-6012.ijrms20160680
33. Rizyal A, Sunrait J, Mishal A. Refractive errors and its associated factors among undergraduate medical students in Kathmandu. Nepal Med Coll J 2019; 21(1):26-30. doi: 10.3 126/nmcj.v21i1.24844
34. Rowaily MAA, Alanizi BM. Prevalence of uncorrected refractive errors among adolescents at King Abdul-Aziz Medical City, Riyadh, Saudi Arabia. J Clin Exp Ophthalmol 2010; 01(03). doi: 10.4172/2155-9570.1000114
35. Salih AA. Prevalence and progression of refractive errors among Al-Mustansiriyah medical students. Eurasian J Med Oncol 2018. doi: 10.14744/ejmo.2017.99609
36. Unnikrishnan B, Hussain S. Pattern of use of contact lens among college students: A cross-sectional study in coastal Karnataka. Indian J Ophthalmol 2009; 57(6):467. doi: 10.410 3/0301-4738.57159
37. Usgaonkar UPS, Tambe P. Awareness and attitude toward refractive error correction methods, among Goan population. J Dent Med Sci 2018; 17(3):04-10. doi: 10.9790/08 53-1703110410
38. Victor G, Urbano A, Marçal S, Porto R, Francesconi CM, Ados SF, Barth B, Alves MR, Nosé W. Primeiro censo brasileiro em cirurgia refrativa (First Brazilian refractive surgery survey). Arq Bras Oftalmol 2005; 68(6):727-733. doi: 10.1590/s0004-27492005000600005
39. WHO. Blindness and vision impairment: Refractive errors. World Health Organization 2013.
40. Yasmin S, Minto H. Community perceptions of refractive errors in Pakistan. Community Eye Health 2007; 20(63):52-3.