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AWARENESS AND PRACTICE OF SCLERAL CONTACT LENS FITTING AMONG OPTOMETRISTS IN NIGERIA– A Cross-Sectional Study

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Abstract

Background: To investigate the awareness and practice of scleral contact lens fitting among optometrists in Nigeria.

Methods: This was a cross-sectional study conducted between November and December 2022 that required optometrists practicing in Nigeria to fill a self-administered, electronic online pretested questionnaire that included 17 questions on practitioner demographics, awareness and practice of scleral contact lenses. Microsoft Excel was used for Descriptive statistics of data obtained, while IBM SPSS Version 25.0 software was used for the Cronbach Alpha test for reliability of the modified questionnaire and Chi-square test to determine the relationship between gender and awareness of scleral contact lens practice.

Results: A total of 307 of the 310 responses were included in the study. 3 of the responses were excluded because they were not properly filled. The mean ± standard deviation (SD) of years of practice was 11.2 ± 8.4 years and the contact lens fitting experience was 7.3 ± 6.9 years. Most optometrists surveyed worked in private practice (60.3%, n=185) or hospital-based settings (30.6%, n=94). The majority of optometrists (94.1%, n=289) reported they were aware of scleral contact lenses and only a small portion (5.9%, n=18) had not heard of it. There was no significant relationship between gender and awareness of scleral contact lens (p=0.422). Out of the 307 responses received, only 44 (14.3%) optometrists indicated that they fit scleral contact lenses. The most frequent condition for which scleral contact lenses were prescribed included Keratoconus (n=33, 75%) and the least condition was Presbyopia (n=1, 2.3%). However, majority of optometrists (n=263, 85.7%) reported scleral contact lenses were not fitted in their practice, the most frequent reason being the unavailability and cost of scleral contact lenses (n=177, 67.3%), followed by negative assumptions and attitudes of patients towards contact lens wear (n=107, 40.7%).

Conclusion: The level of awareness of scleral contact lenses among optometrists in Nigeria is high; however, there is a limited practice of scleral contact lens fitting in Nigeria which could be as a result of the unavailability and cost of these lenses.

Keywords: Scleral contact lenses, Awareness, Practice, Optometrists, Nigeria.

Introduction

Over recent years, there has been a renewed interest in utilizing scleral contact lenses to manage various ocular conditions,[1,2] the fitting of these lenses has surged, particularly for patients with corneal irregularities, ocular surface disease, and ametropia. Scleral lenses have shown remarkable improvement in visual experience for patients, even in cases where traditional contact lenses have failed due to issues like instability or discomfort, while also providing better hydration and comfort for the eyes[3,4].

Research[5] suggests that large-diameter contact lenses, which rest beyond the corneal borders, offer optimal vision correction for irregular corneas, since they can potentially delay or prevent the need for surgical intervention and reduce the risk of corneal scarring. For instance, a case report[6] demonstrated complete resolution of corneal opacity secondary to microbial keratitis after 12 months of scleral lens wear, additionally, a study[7] investigating scleral lens correction in severe keratoconus found that 40 out of 51 eyes, which were candidates for corneal transplant surgery, were successfully managed with long-term scleral lens wear.

Several years ago, only a select few highly specialized lens fitters worldwide could proficiently fit scleral lenses, and only a handful of manufacturers produced them. However, today, numerous contact lens manufacturers offer various scleral lens designs, and coupled with advancements in lens materials have led to improved ocular health, extended wearing times, and simplified lens fitting procedures. Published findings from a global survey of eye-care practitioners have consistently shown an increase in scleral lens utilization since 2011, continuing through 2019[8].

In Nigeria, the practice of contact lens usage has been established and is steadily expanding, mirroring global trends, as evidenced by a study conducted in Abuja[9]. Another study[10] reported a significant 41.40% increase in the annual influx of contact lens patients,however, there remains a dearth of evidence regarding the awareness and practice of scleral contact lenses among optometrists in Nigeria. It is crucial for more practitioners to acquaint themselves with this modality to provide patients with the best available optical correction, especially for challenging cases[5]. Thus, the objective of this study was to explore the awareness and practice of scleral contact lens fitting among optometrists in Nigeria.

Methods

This was a cross-sectional study conducted within Nigeria, questionnaires were sent out via an electronic link (e-link) through social media

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platforms (WhatsApp and Facebook)[4,9,12,13] to the Optometry associations in Nigeria for distribution to its members. These associations were the Nigerian Optometric Association (NOA), Family of Optometric Mentors (FOM), and Women Optometrists in Nigeria (WON). A total of 351 optometrists were targeted to constitute the sample size for this study, however, only 310 optometrists responded to the online questionnaires and 3 responses out of these were exempted from the study due to improper filling of the questionnaire, giving a total of 307 valid responses. This yielded a response rate of 87%. The online questionnaires were circulated between the 11th of November and the 18th of December 2022 and distributed by geographical areas to North (26.1%, n=80), South-West (19.5%, n=60), South-East (17.3%, n=53), and South-South (37.1%, n=114).

Data Collection and Questionnaire Design

Self-administered, anonymized questionnaires were developed by adapting and modifying questions from previous studies[4,8,11,12], it was then pretested by distributing them to 20 optometrists. The reliability of this modified questionnaire was tested using the Cronbach's Alpha test, and a score of 0.771 proved its reliability. The questionnaires were then distributed to optometrists all over Nigeria through a secured web service: https://forms.gle/9U6DdzZAMWLzpgxo7 (Google form). The study was approved by the Ethical Committee of the Department of Optometry, University of Benin (EC/UBEN/LSC.OPT/22/96) and conducted in accordance with the Helsinki Declaration. Participation was voluntary, all data captured were kept confidential and no subject was identified by name[4,8,11,12]. The questionnaire focused on the following,

- Practitioner demographics – This included gender distribution, geographical location, practice type, years of experience, and years of contact lens fitting experience[4,8,11,12].
- Awareness of scleral contact lens – This included questions to ascertain if the practitioner had heard of scleral contact lens[8].
- Practice of scleral contact lens – This included questions that investigated scleral contact lens practice, challenges involved in scleral contact lens practice, and potential interventions[4].

The questionnaires were divided into two sections that directed questions toward practitioners who fit scleral contact lenses in their practice and practitioners who did not fit scleral contact lenses. The online questionnaires could only be completed once from any device to reduce accidental bias from multiple completions[11].

Inclusion and Exclusion Criteria

Only Optometrists who, during the survey period, were practicing in Nigeria were eligible to participate

4. Pucker AD, Bickle KM, Jones-Jordan LA, Ticak A, Kwan JT, Kuhn J, Mathew J, &Kunnen CME. Assessment of a practitioner's perception of scleral contact lens complication. Contact Lens and Anterior Eye. 2018;42: 15-19.
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in the study. Exclusion criteria included Nigerian optometrists practicing in foreign countries. In addition, only questionnaires which were properly and completely filled were used for this study.

Data Analysis

Data obtained from this study were used to calculate the mean, frequencies, and percentages for categorical variables. Results were presented in tables and figures (pie and bar charts). This was done with Microsoft Excel. Cronbach Alpha test for reliability of the modified questionnaire was done and Chi square test was used to determine the relationship between gender and awareness of scleral contact lens using IBM Statistical Package for Social Sciences (SPSS) Version 25.

RESULTS

Subject Demographics

A total of 307 valid responses of the 310 responses received were included in the study. Three (3) responses were excluded because they were not properly filled. 51.8% (n=159) of the respondents were female and 47.9% (n=147) were male, although one participant (0.3%) preferred not to disclose their gender.

The distribution of responses as per duration of practice, contact lens fitting experience, and type of practice are depicted in Table 1. The mean ± standard deviation (SD) of years of practice was 11.2 ± 8.4 years and the contact lens fitting experience was 7.3 ± 6.9 years. Most optometrists surveyed worked in private practices (60.3%, n=185) or hospital based settings (30.6%, n=94), though other practice modes were represented (Table 1).

Table 1. Subjects Demographics (N=307)

Duration of Practice (years)	**n (%)**
<5	79 (25.7)
5 – 10	92 (30)
10 – 25	114 (37.1)
>25	22 (7.2)
Contact Lens Fitting Experience (years)	**n (%)**
<5	145 (47.2)
5 – 10	90 (29.3)
10 – 25	65 (21.2)
>25	7 (2.3)
Type of Practice	**n (%)**
Private Practice	185(60.3%)
Hospital Based	94 (30.6%)
University-Based	18 (5.9%)
Corporate Practice	8 (2.6%)
Non-Governmental Organization (NGO)	1 (0.3%)
Ministry	1 (0.3%)

Awareness of Optometrists

Optometrists were asked to indicate if they had heard of scleral contact lenses. Majority of optometrists (94.1%, n=289) reported they were aware of scleral contact lenses and only a small portion (5.9%, n=18) had not heard of it.

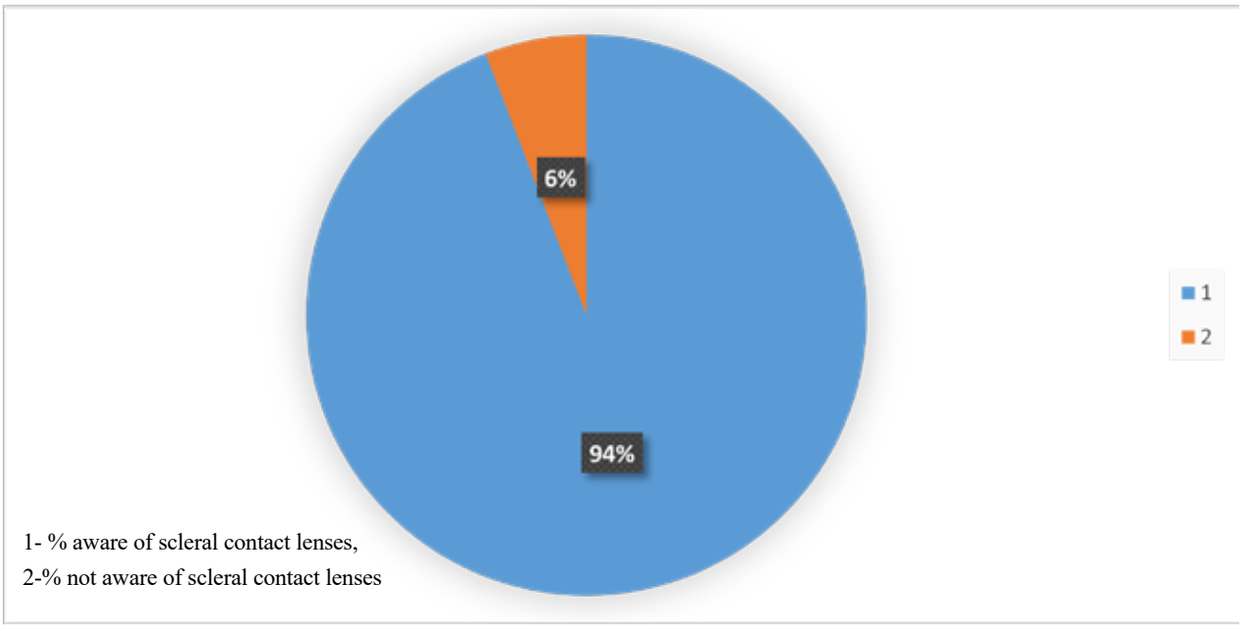

Figure 1. Level of awareness of optometrists to scleral contact lenses in Nigeria.

Table 2. Relationship between Gender and Awareness of Scleral Contact Lens

		Have you heard of scleral contact lenses? (Awareness)		Total	Chi-square (p-value)
		No	Yes		
Gender	Female	12	147	159	0.422
	Male	6	141	147	
	Not disclosed	0	1	1	
	Total	18	289	307	

Significant at p ≤ 0.05

Chi square shows there is no significant relationship between gender and awareness of scleral contact lens (p = 0.422).

Practice of Scleral Contact Lens

Optometrists were asked to indicate if they fit scleral contact lenses in their respective practices. Out of the 307 responses received, only 44 (14.3%) optometrists indicated they fit scleral contact and majority of optometrists (n=263, 85.7%) reported scleral contact lenses are not fitted in their practices.

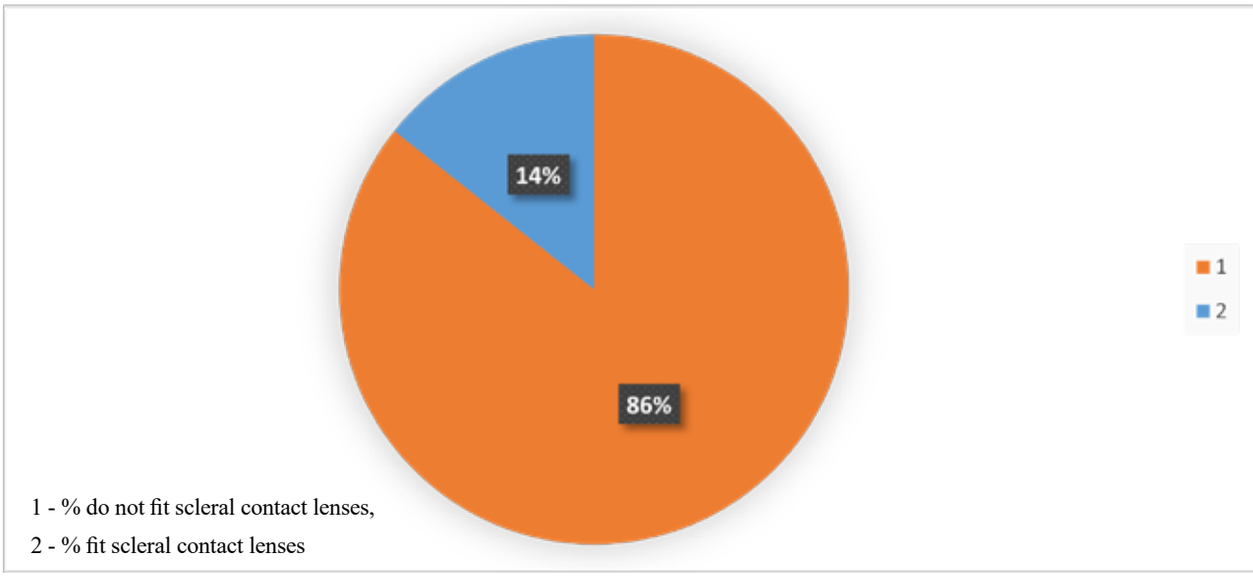

Figure 2. Percentage of optometrists that fit scleral contact lenses in Nigeria.

Conditions for fitting Scleral lenses

Furthermore, survey questions were directed towards optometrists that indicated they fit scleral contact lenses. These optometrists were asked to select conditions for which they prescribed scleral contact lenses, of which they could select one or more alternatives among the options provided.

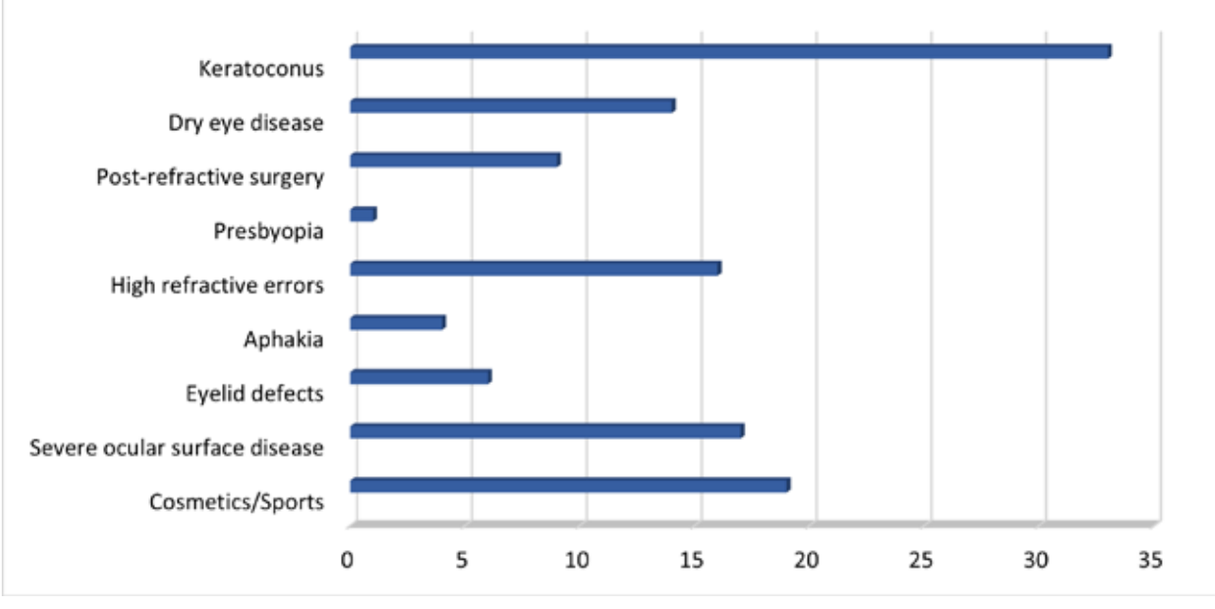

Figure 3. Conditions for fitting scleral contact lens in Nigeria.

The most frequent condition included Keratoconus (n=33, 75%) and the least condition for which scleral contact lenses were prescribed was Presbyopia (n=1, 2.3%)

Proactivity profile

In addition, the level of these optometrists' proactivity was tested by asking respondents to report on a scale from 0 (not at all) to 10 (highly), the level at which they proactively recommended scleral contact lenses to their patients[11,12]. The scores were used to identify three profiles of the respondents: proactive (self-reported scores of eight or more), active (scores between 5 and 7), and inactive (scores of four and below).

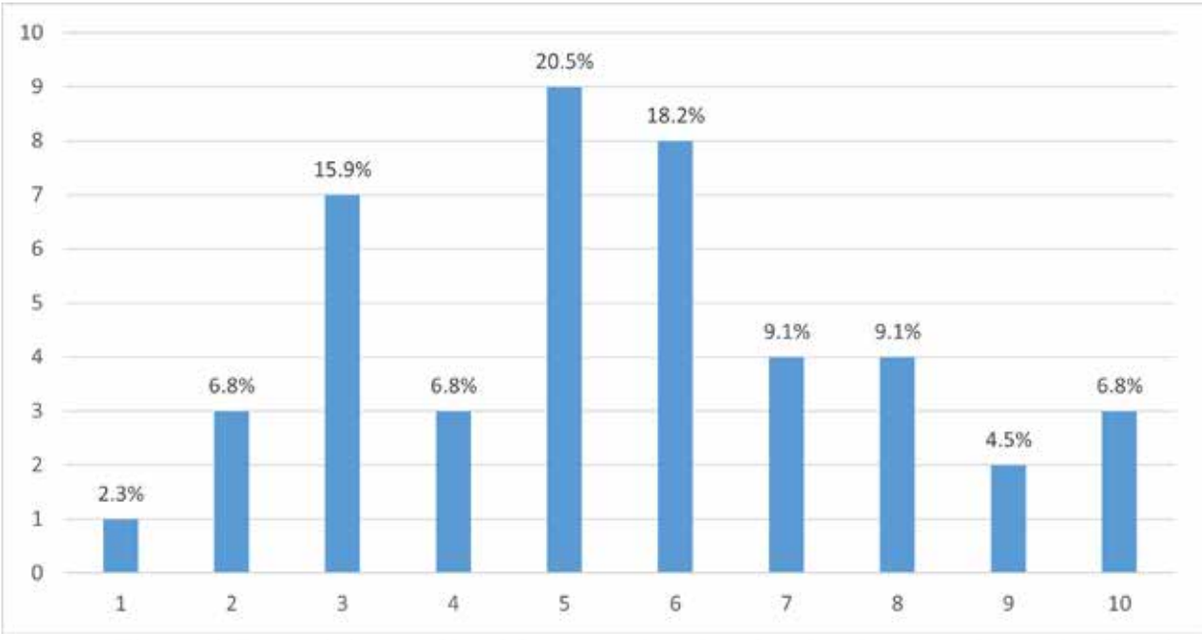

Figure 4. Proactivity profile of Optometrists that fit scleral contact lenses in Nigeria.

According to the categorization described, 20.45% (n = 9) of the Optometrists were identified as proactive, 47.73% (n=21) as active, and 31.82% (n=14) as inactive.

Challenges encountered in Scleral Lens Practice

These optometrists were also asked to select the challenges encountered in scleral contact lens practice (figure 5).

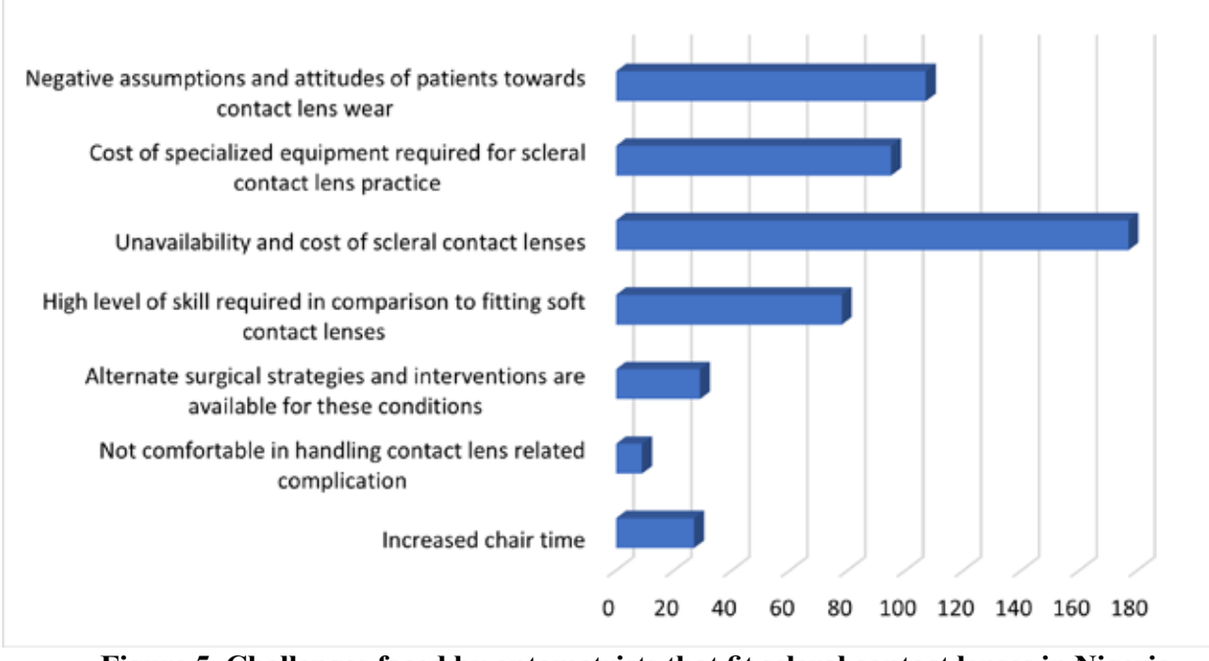

Figure 5. Challenges faced by optometrists that fit scleral contact lenses in Nigeria.

Unavailability and cost of scleral contact lenses (n=31, 70.5%) was the most frequent challenge followed by negative assumptions and attitudes of patients towards contact lens wear (n=30, 68.2%).

11. Thite N, Desiato A, Shinde L, Wolffsohn JS, Naroo SA, Rubido JS, Cho P, Jones D, Villa-Collar C, Carrillo G, Chan O, Wang H, Iomdina E, Tarutta E, Proskurina O, Fan C, Zeri F, Bakkar MM, Barodawala F, Dabral N, Lafosse E, Lee C, Nichols J, Chan J, Park K, Nair V, van der Worp E, Vankudre G, Maseedupally V, Bhattarai Y, Nagzarkar D, Brauer P, & Gil-Cazorla R. Differences in practitioner experience, practice type, and profession in attitudes toward growing contact lens practice. Eye & Contact Lens. 2022;48(9): 369-376.
12. Martinez-Perez C, Villa-Collar C, Santodomingo-Rubido J, Shinde L, Thite N, &Wolffsohn JS. Opportunities and threats to contact lens practice in Spain. Journal of Optometry. 2022;1-12.

Optometrists' reasons for not fitting Scleral Lenses

Survey questions were also directed to optometrists who reported that they do not fit scleral contact lenses. The possible reasons were investigated requesting respondents to select one or more alternatives among the options provided (figure 6).

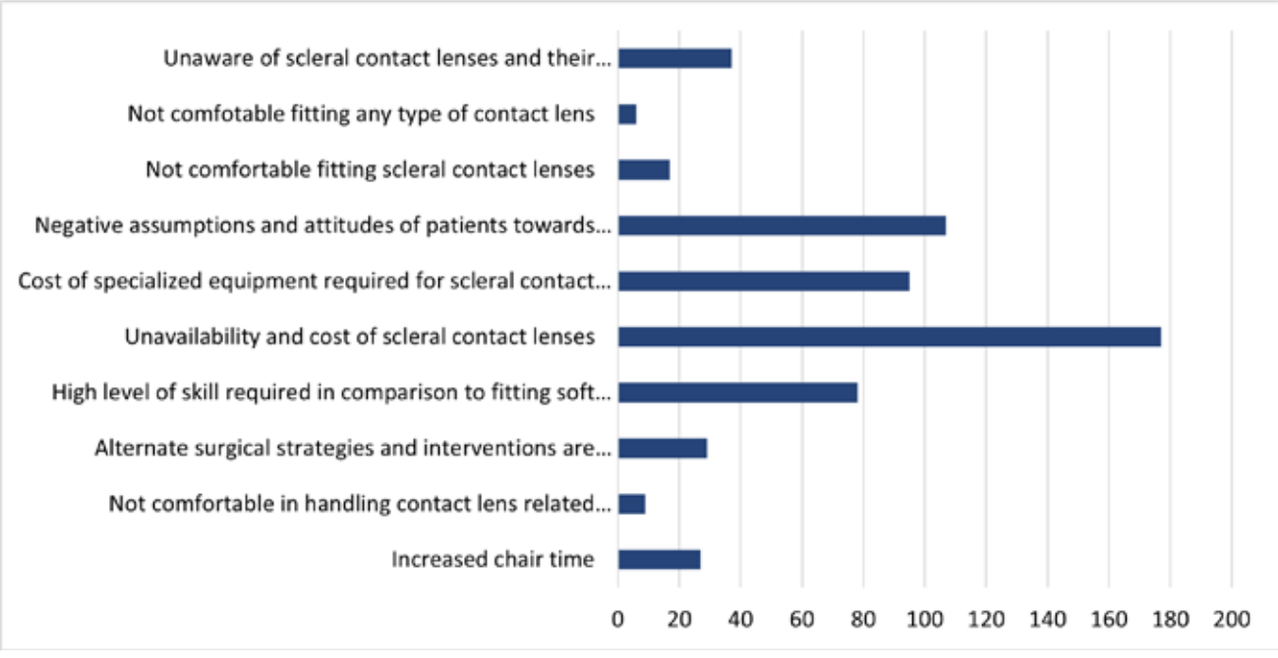

Figure 6. Reasons optometrists in Nigeria are not involved in scleral contact lens practice.

The most frequent reason was the unavailability and cost of scleral contact lenses (n=177, 67.3%), followed by negative assumptions and attitudes of patients towards contact lens wear (n=107, 40.7%).

Potential Interventions

A list of potential interventions was presented to optometrists for the promotion of scleral contact lens practice in Nigeria in the near future.

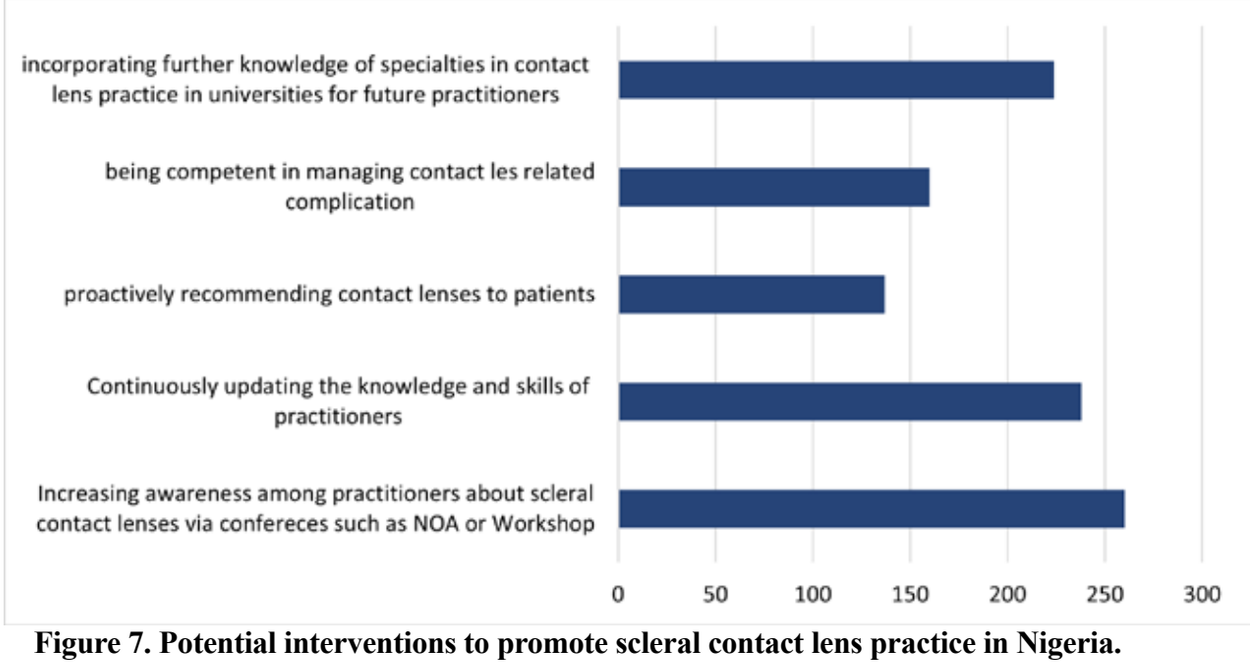

Figure 7. Potential interventions to promote scleral contact lens practice in Nigeria.

Increasing awareness among practitioners about scleral contact lenses via conferences such as Nigerian Optometric Association (NOA) or Workshop (n=260, 84.69%) was the highest rated possible intervention, whereas proactively recommending contact lenses to patients was perceived slightly less relevant (n=137, 44.63%).

DISCUSSION

In this study, the numbers of respondents were similar between females and males. This finding contradicts the study conducted by Ezinne *et al*.[9] that involved 38% male and 62% female optometrists and reported it was a reflection of the gender distribution of optometrists in Nigeria. There was no significant relationship between the gender of optometrists and the awareness of scleral contact lens (p=0.422). In addition, most optometrists surveyed worked in private practice or hospital based setting.

According to the results obtained, the level of awareness of scleral contact lenses among optometrists in Nigeria is high as majority of optometrists reported they were aware of the existence of scleral contact lenses and only a small portion had not heard of it. This demonstrates that there has been a growing awareness of this specialty lens since 2019 when a study[13] conducted on the use of scleral lenses in the visual rehabilitation of keratoconus, described the awareness of scleral lenses in Nigeria as being at its infancy stage. However, results on scleral contact lens practice revealed there is poor scleral contact lens practice in Nigeria as only a handful of optometrists indicated they fit scleral contact lenses in their practice whereas the greater part indicated otherwise. This is comparable to a report given by Woods *et al*.[8] in which out of the 40 countries surveyed on the use of scleral contact lenses, the highest rate of fitting was 5.9% in Switzerland and six of the countries surveyed had no record of scleral contact lens practice. The main reason given for not fitting scleral contact lenses was the unavailability and cost of scleral contact lenses, followed by negative assumptions and attitudes of patients towards contact lens wear. Notably, these responses were similar to the challenges encountered by optometrists who fit scleral contact lens in their practice as unavailability and cost of scleral contact lenses was the most frequent challenge followed by negative assumptions and attitudes of patients towards contact lens wear. Therefore, the low level of scleral contact lens fitting in Nigeria can be linked to the unavailability and cost of scleral contact lenses. This is similar to a study conducted by Gcabashe *et al*.[14] where there was a deficiency in the minimum standard of optometric care for keratoconus in public sector eye care facilities in KwaZulu-Natal, South Africa primarily because of a lack of the necessary contact lens fitting sets. This was also observed in a study conducted by Woods *et al*.[8] in which limited availability was a contributing factor for scleral lenses not being fitted in some countries. Certainly, the availability of resources affects the quality of medical services and insufficient infrastructures, resources and equipment would lead to low quality of medical services as stated in a study conducted by Mosadeghrad[15] on the factors affecting medical service quality. Concerning the negative assumptions and attitudes of patients towards contact lens wear, this was observed in a study carried out by Alipour *et al*.[16] in which mini scleral lenses were dispensed for 13 patients and six of them refused to order the lenses due to fear,

8. Woods CA, Efron N, & Morgan P. Are eye-care practitioners fitting scleral contact lenses?Clinical and Experimental Optometry. 2020;103: 449-453.
9. Ezinne NE, Austin E, Ilechie AA, & Mashige KP. Contact lens prescribing patterns in Abuja, Nigeria. Journal of the Nigerian Optometric Association. 2019; 21(1): 26-32.
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16. Alipour F, Kheirkhah A, &Behrouz MJ. Use of mini scleral contact lenses in moderate to severe dry eye. Contact Lens and Anterior Eye. 2012;35: 272-276.

difficulty handling, economic issues and other modalities recommended such as further surgical intervention by their original physician.

Furthermore, optometrists who fit scleral contact lenses worked majorly in private practice than hospital based setting and may be due to a lack of established referral systems in Nigeria, as described by Thite *et al*.[11] where it was stated that independent practices may reflect the central role of practices offering contact lens management at all levels including specialty lenses, in countries without an established referral system. These optometrists indicated that scleral lenses were most often prescribed for keratoconus, and this is identical to a study conducted by Nau *et al*.[17] and Shornack *et al*.[18] in which corneal irregularity (74% and 87% respectively) was the condition for which scleral lenses were most often prescribed.

The highest rated intervention for the promotion of scleral contact lens practice in Nigeria was to increase awareness among practitioners about scleral contact lenses via conferences such as Nigerian Optometric Association (NOA) conference or Workshop. The implementation of this intervention would most definitely bring about a positive turn as the study conducted by Woods *et al*.[8] revealed that increased awareness, interest in professional journals and attendance to clinical conferences were key factors which contributed to a significant increase in the scleral lens fitting rate worldwide.

STRENGTHS AND LIMITATIONS

The responses collected from the large number of optometrists has been able to determine the level of awareness and practice of scleral contact lenses among optometrists in Nigeria. It has shown that the unavailability and cost of scleral lenses is a barrier in the progress of this specialty lenses and that increased awareness may somewhat increase interest in optometrists to engage in this specialty. However, this study has potential limitations, one of which is the short duration of time that the questionnaire was in circulation for optometrists to fill.

CONCLUSION

This study investigated the awareness and practice of scleral contact lens fitting among optometrists in Nigeria. It found that the level of awareness of scleral contact lenses among optometrists in Nigeria is high; however, there is a limited practice of scleral contact lens fitting which could be as a result of the unavailability and cost of these lenses.

RECOMMENDATIONS

Professional bodies such as the Nigerian Optometric Association (NOA) should increase awareness of scleral contact lenses among professionals by including scleral contact lenses as topics in conferences and journals released.

8. Woods CA, Efron N, & Morgan P. Are eye-care practitioners fitting scleral contact lenses?Clinical and Experimental Optometry. 2020;103: 449-453.
11. Thite N, Desiato A, Shinde L, Wolffsohn JS, Naroo SA, Rubido JS, Cho P, Jones D, Villa-Collar C, Carrillo G, Chan O, Wang H, Iomdina E, Tarutta E, Proskurina O, Fan C, Zeri F, Bakkar MM, Barodawala F, Dabral N, Lafosse E, Lee C, Nichols J, Chan J, Park K, Nair V, van der Worp E, Vankudre G, Maseedupally V, Bhattarai Y, Nagzarkar D, Brauer P, & Gil-Cazorla R. Differences in practitioner experience, practice type, and profession in attitudes toward growing contact lens practice. Eye & Contact Lens. 2022;48(9): 369-376.
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APPENDIX A
Supplementary Questionnaire

Dear Sir/Ma,

In the past few years, there has been a resurgence in interest in the use of scleral contact lenses (ScCL) for the management of several eye conditions in various parts of the globe. These lenses have been indicated for use in the management of keratoconus, severe dry eye, postcorneal transplant and multiple other conditions. As eye care practitioners, such cases present themselves on a yearly, and in some instances, monthly basis. Utilizing scleral contact lenses in the management of these conditions would provide patients with optimal care and satisfaction. Hence, I wish to conduct this study to understand the views of eye care practitioners in Nigeria regarding scleral contact lens practice. I would appreciate it, if you could complete the attached brief survey; completion of which is expected to take about 5 minutes. The questions are quite general and there are no known or anticipated risks to participation in this study. Your participation is voluntary and anonymous. All information you provide will be kept confidential.

1. Gender *Mark only one oval.
   - o Male
   - o Female
   - o Prefer not to mention
2. Geographical location (wherein you primarily practice) * Mark only one oval.
   - o North
   - o South-West
   - o South-East
   - o South-South
3. Type of Practice *Mark only one oval.
   - o University based
   - o Hospital based
   - o Private practice
   - o Corporate practice
   - o Other:
4. For how many years have you been practicing? *Mark only one oval.
   - o < 5 years
   - o 5- 10 years
   - o 10 - 25 years
   - o >25 years
5. What is your contact lens fitting experience in years? *Mark only one oval.
   - o < 5 years
   - o 5- 10 years
   - o 10 - 25 years
   - o >25 years
6. Have you heard of scleral contact lenses? *Mark only one oval.
   - o Yes
   - o No

7. Do you fit scleral contact lens in your practice? *Mark only one oval.

   o Yes Skip to question 8
   o No Skip to question 14

YES, I FIT SCLERAL CONTACT LENSES

8. What conditions do you usually prescribe scleral contact lens for?* (you can select multiple answers)Tick all that apply.

   o Keratoconus
   o Dry eye disease
   o Post-refractive surgery
   o Presbyopia
   o High refractive errors
   o Aphakia
   o Eyelid defects
   o Severe ocular surface disease
   o Cosmetic/Sports

9. If "yes", how proactive would you consider YOUR contact lens practice in term of recommending scleral contact lenses to your patients on a scale from 0 (not at all) to 10 (highly)? * Pick only one number _____

10. Please kindly select the challenges you may be facing as a scleral contact lenspractitioner (you can select multiple answers)*Tick all that apply.

    o Increased chair time
    o Not comfortable in handling contact lens related complication
    o Alternate surgical strategies and interventions are available for these conditions
    o High level of skill required in comparison to fitting soft contact lenses
    o Unavailability and cost of scleral lenses
    o Cost of specialized equipment required for scleral contact lens practice
    o Negative assumptions and attitudes of patients towards contact lens wear

11. Any other challenges? Please specify here

    _____

    _____

12. What interventions would you propose to promote scleral contact lens practice in Nigeria in the near future? (you can select multiple answers)* Tick all that apply.

    o Increasing awareness among practitioners about scleral contact lenses via conferences such as NOA or workshop.
    o Continuously updating knowledge/skills of practitioners
    o Proactively recommending contact lenses to patients.
    o Being competent in managing contact lens-related complications
    o Incorporating further knowledge of specialties in contact lens practice in universities for future practitioners

13. Any other interventions?

_____

_____

NO, I DO NOT FIT SCLERAL CONTACT LENSES.

14. Please kindly select the reasons why you do not fit scleral contact lenses.**Tick all that apply.*

- o Increased chair time
- o Not comfortable fitting scleral contact lenses
- o Not comfortable fitting any type of contact lens
- o Not comfortable in handling contact lens related complication
- o Alternate surgical strategies and intervention are available for these conditions
- o High level of skill required in comparison to fitting soft contact lenses
- o Unavailability and cost of scleral lenses
- o Cost of specialized equipment required for scleral contact lens practice
- o Unaware of scleral contact lenses and their applications/benefits
- o Negative assumptions and attitudes of patients towards contact lens wear

15. Other reasons? Please specify here

_____

_____

16. What interventions would you propose to promote scleral contact lens practice in Nigeria in the near future? (you can select multiple answers)* Tick all that apply.

- o Increasing awareness among practitioners about scleral contact lenses via conferences such as NOA or workshop.
- o Continuously updating knowledge/skills of practitioners
- o Proactively recommending contact lenses to patients.
- o Being competent in managing contact lens-related complications
- o Incorporating further knowledge of specialties in contact lens practice in universities for future practitioners

17. Any other intervention? Please specify here

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