



Knowledge, usage and barriers associated with contact lens wear in Ghana



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ABSTRACT

Background: Despite findings that contact lens wear for vision correction provides better quality of life than spectacles, contact lens use in developing countries is low. This study evaluated knowledge, usage and barriers associated with contact lens wear among spectacle wearers in Cape Coast, Ghana.

Method: A cross-sectional survey using a structured questionnaire was conducted on an adult population of spectacle wearers to assess their knowledge of contact lens wear for vision correction. The participants were proportionately sampled from three eye clinics in the Cape Coast Metropolis, Ghana. Questionnaires were either self-administered or completed with the help of a research assistant.

Results: Of the 422 participants, only 147 (34.8%) knew of contact lens wear for vision correction. The proportion of spectacle wearers reporting history of contact lens wear was 14 (3.3%). Barriers to contact lens wear reported were satisfaction with vision through spectacles 102 (25.0%), lack of adequate information 111 (27.2%), fear of side effects 94 (23.0%) and cost 78 (19.1%). The younger adults and those with higher number of changes of spectacles were more likely to know of contact lenses.

Conclusion: Knowledge and usage of contact lenses among spectacle wearers was low. Contact lens education and demonstration of visual performance through fitting of trial contact lenses on potential candidates may help overcome barriers to contact lens wear.

1. Background

The global magnitude of visual impairment attributable to refractive disorders of the eye is alarming. It is estimated that uncorrected refractive error accounts for distance vision loss in 670 million persons [1], and presbyopia is responsible for impaired near vision in 517 million persons [2]. Sub-Saharan Africa is one of the geographical regions worldwide with the highest burden of vision loss due to refractive conditions [3].

Corrective eyewear, comprising spectacles and contact lenses, remains the most popular modality for vision correction even in developed countries [4–7], despite advancement in surgical refractive corrective procedures including laser-assisted *in situ* keratomileusis (LASIK), photorefractive keratotomy, radial keratotomy, and corneal implants. Contact lens wearers report better quality of life than spectacle wearers [8,9]. Literature suggests that contact lenses are more cosmetically appealing, provide optimal vision due to the minimization in spherical aberration and prismatic effect, and enhances peripheral vision because of the associated lens movement during eye rotation [10,11]. Myopia correction with soft multifocal contact lenses

and orthokeratology contact lenses has been found to be promising in delaying myopia progression [12]. This is thought because contact lens correction of on-axis moderate to high myopia results in myopic defocus in the peripheral retina, inhibiting axial growth of the eyeball whereas spherical spectacle lenses induce hyperopic defocus which enhances axial growth of the eye [13]. Also, the demand of some occupations such as sports and theater performance discourage spectacle use [8,9]. Moreover, atypical ocular conditions such as irregular corneal astigmatism, aniseikonia, keratoconus and nystagmus are better managed with contact lenses than spectacles [14–16].

Studies indicate very high contact lens-wearing populations in developed countries including the United States of America, Japan and Saudi Arabia with prevalence estimates ranging from 17 to 70% [17–19]. On the contrary, information gleaned from review of recent surveys on refractive error in developing countries of Sub-Saharan Africa, and particularly in Ghana, suggests that contact lens wear for vision correction is almost negligible [20], despite increase in number of trained optometrists and other eyecare providers equipped with the skill for contact lens fitting. Currently, there are over 300 practicing optometrists in Ghana [21]. Data on the knowledge and barriers toward

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contact lens wear in this population may be essential for formulation of effective strategies to promote contact lens wear. A literature search in Google Scholar and PubMed was conducted to identify studies on knowledge and barriers associated with contact lens wear for vision correction, using keywords including ‘knowledge AND contact lens’, attitude AND contact lens, barriers AND contact lens. Evaluation of all relevant literature on this topic in the context of Sub-Saharan Africa showed paucity of information with only one study on a subpopulation of spectacle wearers in Nigeria, although with fewer subjects [22]. Besides, no such study was found reporting on any population in Ghana, making it necessary for exploration of such factors. Spectacle wearers have felt the need for refractive correction and, hence, constitute the most likely good contact lens candidates. This study, therefore, assessed the knowledge, usage and barriers associated with contact lenses among spectacle wearers, as a step to enhance advocacy and use of contact lenses.

2. Materials and method

2.1. Ethics and consent to participate

Ethical approval for the study was obtained from the Institutional Review Board, University of Cape Coast, Cape Coast, Ghana. Also, permission was given by each of the three eye care facilities used in the study, all of which are from the Cape Coast Metropolis, namely; the Optometry Eye Clinic of the University of Cape Coast, Eye Unit of the Cape Coast Teaching Hospital, and the Christian Eye Centre in Cape Coast. Informed consent was obtained from each participant by signature or thumbprint, in accordance with the tenets of the Declaration of Helsinki. An impartial witness, who was either a family member of the participants or health staff in those eyecare centers, was involved in interpretation and facilitating the consent process for subjects who were illiterates.

2.2. Sample size

The required sample size was calculated by the function $n = \chi^2 NP (1 - P) / [d^2 (N - 1) + \chi^2 P (1 - P)]$, where $\chi^2 = 3.841$ for 1 degree of freedom at the 95% confidence level, Cape Coast population (N) = 169,894, expected prevalence of spectacle wearers (P) = 0.5, desired error bound (d) = 0.05. The desired sample size was 383. This minimum sample size was increased by 20%, giving a total of 460 participants to compensate for non-response and efficiency rates of the questionnaire.

2.3. Study design and sampling

A cross-sectional survey using a structured questionnaire was conducted on an adult population of spectacle wearers who attended the 3 eyecare facilities in the Central region of Ghana from 5th January to 25th March, 2015. These selected facilities have the full cadre of trained eye care personnel and receive high patient attendance. The eligibility criteria for selection of participants into the study were age 18 years and older, habitual wear of spectacles and history of use of spectacles for at least six months for refractive correction. Based upon information on the daily average number of patients attending each eye care facility, a proportionate sample was drawn to constitute the total 460 participants. Thus, 119, 147 and 194 participants were randomly sampled from the visiting patients of the Optometry Eye Clinic, the Eye Unit of the Cape Coast Teaching Hospital, and the Christian Eye Center, respectively.

2.4. Instrument development and data collection

A structured questionnaire to determine knowledge and usage of contact lenses, source of contact lens education and associated barriers

to contact lens wear was developed purposely for this study. Selection of the variables to be included in the study was based upon substantive and theoretical relevance of the factors related to the prescription of contact lenses [23]. Other variables considered relevant were included following a deliberation among the eyecare practitioners involved in the study. There were two versions of the questionnaire, the original version in English and its Fante translation, both of which were used in the study. There is no acceptable name for contact lenses since it is quite new to the Ghanaian culture, so same was maintained in the Fante questionnaire. Questionnaire was either self-administered or completed with the help of three trained research staffs for the participants who could not read the questionnaire. It took an average of 5 min for a questionnaire to be completed per respondent. Pretesting of the questionnaire was conducted by experienced researchers in 2 stages; first, a participating pretest was conducted on 15 respondents to elicit their reaction or understanding of questions, followed by an undeclared pretest on another 15 respondents after which some necessary modifications were made to the final questionnaire used for the study.

Data on demographic characteristics (gender, age), social determinants (education, occupation), and spectacle wear characteristics (refractive status, presence of astigmatic correction, presence of near correction, spectacle wear duration, and number of times of change of spectacles) were collected. Information on participants’ refractive status, presence of astigmatic correction and presence of near correction was obtained on spot using a lensmeter to measure the powers of the spectacle prescriptions worn. Also, information on the source of contact lens education and barriers associated with contact lens wear was elicited with the questionnaire.

2.4.1. Measured outcomes

The two measured outcomes were spectacle wearers’ knowledge of contact lens wear and usage of contact lenses. In order to measure knowledge of contact lens wear, responses to this question were analyzed: “Which of the following statement(s) is/are true about a contact lens?” The responses that were available to be chosen were: (1) *It is a less visible lens placed on the eyeball*, (2) *It can be worn to correct vision*, (3) *It can be worn for cosmetic purpose*, (4) *It is an alternative to spectacles use*, (5) *I am not sure*. Responses 1–4 are correct, hence ticking any one of these responses was assigned a score of one. Response 5 was assigned a score of zero. Respondents could tick one or more responses known to be correct regarding contact lenses. The total score per respondent was equal to the sum of scores of all correct responses ticked. However, if any respondent ticked response 5 and any of the other correct responses, that respondent was still scored zero. This was done to discourage respondents from guessing. Also, if a respondent ticked one or more of the correct responses, that respondent was deemed knowledgeable of contact lenses while those who ticked response 5 were considered not knowledgeable.

To assess usage of contact lenses, participants responded to the question “Do you use a contact lens?” The response options were: (1) Yes, I do use it interchangeably with my spectacles, (2) I did use it in the past, (3) No, I don’t use a contact lens. Responses 1 and 2 were considered as positive indicators of contact lens usage while response 3 was considered non-usage of contact lenses.

2.5. Data analysis

Statistical data analysis was conducted using Statistical Package for Social sciences (Version 21, SPSS, Inc., Chicago, IL, USA). Data were presented as frequencies and percentages distributions. Binary logistic regression was employed to determine the factors associated with knowledge of contact lens wear. To compare the mean scores in knowledge of contact lens wear by the different sources of education, the Kruskal–Wallis test was used. The threshold for statistical significance was set at a probability of 5%.

Table 1
Factors associated with knowledge of contact lens wear in spectacle wearers using logistic regression.

Characteristics	Total (%)	No. (%) of persons who know of contact lenses (n = 147)	OR (95% CI)	p-Value
Gender			1.00	0.497
Male	195 (46.2)	77 (52.4)	1.23 (0.68–2.23)	
Female	227 (53.8)	70 (47.6)	1.00	
Age group (years)				0.029*
18–20	56 (13.3)	21 (14.3)	1.00	
21–30	125 (29.6)	73 (49.7)	1.73 (0.83–3.63)	0.144
31–40	26 (6.2)	12 (8.2)	1.15 (0.31–4.31)	0.834
41–50	53 (12.5)	9 (6.1)	0.19 (0.04–0.90)	0.036
51–60	59 (14.0)	14 (9.5)	0.35 (0.07–1.64)	0.180
61 +	103 (24.4)	18 (12.2)	0.33 (0.06–1.81)	0.202
Education level				0.881
None	22 (5.2)	–	0.00	0.998
Primary	8 (1.9)	–	0.00	0.999
Junior high school	53 (12.6)	2 (1.4)	1.63 (0.67–3.93)	0.279
Senior high school	63 (14.9)	7 (4.7)	1.01 (0.52–1.98)	0.979
Tertiary education	276 (65.4)	138 (93.9)	1.00	
Occupation				0.370
None	32 (7.6)	4 (2.7)	1.26 (0.26–5.97)	0.776
Schooling	158 (37.4)	80 (54.4)	1.33 (0.29–6.08)	0.711
Teaching	32 (7.6)	12 (8.2)	2.23 (0.42–11.88)	0.346
Health work	21 (5.0)	12 (8.2)	0.11 (0.10–1.25)	0.075
Trading/business	33 (7.8)	1 (0.7)	0.34 (0.03–4.03)	0.395
Artisanship	14 (3.3)	1 (0.7)	0.81 (0.06–10.91)	0.872
Farming	10 (2.4)	1 (0.7)	1.11 (0.25–4.83)	0.895
Pensioner	46 (10.9)	13 (8.8)	1.79 (0.33–9.64)	0.499
Civil service	29 (6.9)	11 (7.5)	0.78 (0.17–3.69)	0.756
Others	47 (11.1)	12 (8.2)	1.00	
Refractive status				0.575
Emmetropia	55 (13.0)	15 (10.2)	1.00	
Myopia	235 (55.7)	90 (61.2)	0.82 (0.30–2.22)	0.691
Hyperopia	132 (31.3)	42 (28.6)	0.63 (0.23–1.75)	0.373
Astigmatic correction				
Yes	53 (12.6)	25 (17.0)	1.12 (0.56–2.24)	0.742
No	369 (87.4)	122 (83.0)	1.00	
Bifocal correction				
Yes	156 (37.0)	35 (23.8)	1.04 (0.30–3.59)	0.945
No	266 (63.0)	112 (76.2)	1.00	
Spectacles wear duration				0.253
< 2	97 (23.0)	21 (14.3)	1.00	
2–5	134 (31.8)	47 (32.0)	1.77 (0.83–3.76)	0.136
5+	191 (45.3)	79 (53.7)	1.90 (0.85–4.22)	0.118
No. of changes of spectacles				0.003*
None	98 (23.2)	17 (11.6)	1.00	
1–5	270 (64.0)	98 (66.7)	1.83 (0.85–3.94)	0.121
6–10	41 (9.7)	24 (16.3)	4.42 (1.46–13.37)	0.009
10+	13 (3.1)	8 (5.4)	14.72 (2.94–73.81)	0.001

* p < 0.05.

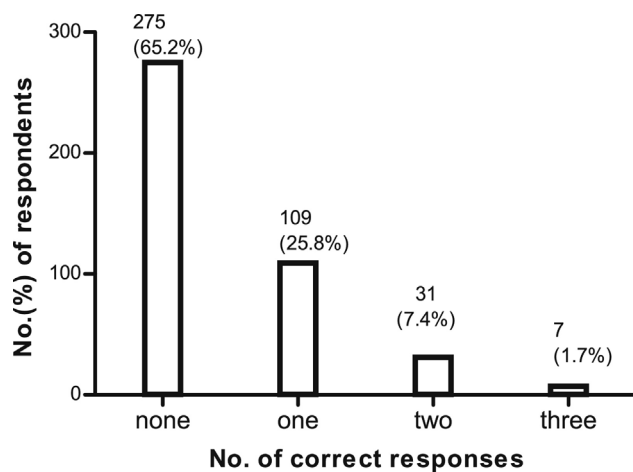


Fig. 1. Number of correct responses about contact lens wear by spectacle wearers.

3. Results

3.1. Demographic characteristics

Of the total 460 questionnaires distributed, 422 responded, a response rate of 91.7%. Most of the respondents completed the questionnaire by self-administration except in 42 (10.0%) respondents wherein assistance was provided in the form of interpretation. The respondents comprised 195 males (46.2%) and 227 females (53.8%) aged between 18 and 86 years (mean age: 42.6 ± 20.2 years). The proportion of respondents aged below 40 years old was 207 (49.1%) and 276 (65.4%) had tertiary education. Table 1 shows the demographic characteristics of the spectacle wearers surveyed. Concerning the spectacle wear characteristics of the respondents, 156 (37%) were found wearing bifocal lenses, and 53 (12.6%) of the prescriptions had astigmatic correction. Ninety-seven (23%) of the respondents had worn spectacles for less than two years and 191 (45.2%) had worn spectacles for over five years. Two hundred and seventy (64%) of the respondents had changed their spectacles between one to five times.

Table 2
Knowledge and behavior of spectacle wearers toward contact lens wear.

Variable	Responses	No. (%) (n = 422)
Knowledge of contact lenses	Which of the following statement (s) is/are true about a contact lens?	
	It is a less visible lens placed on the eyeball	117 (27.7)
	It can be worn to correct vision	57 (13.7)
	It can be worn for cosmetic purpose	12 (2.8)
	It is an alternative to spectacle use	7 (1.7)
Usage of contact lenses	I am not sure	275 (65.2)
	Do you use a contact lens?	
	I use it interchangeably with my spectacles	14 (3.3)
	I have used a contact lens in the past	0
	I have never used a contact lens	408 (96.7)

3.2. Knowledge in contact lens wear and associated factors

Only 147 (34.8%) respondents provided at least one correct response on contact lens wear and 38 (9.0%) chose two or more correct responses on contact lens wear (Fig. 1). The scores for knowledge in contact lens wear among the respondents ranged from 0 to 3 (mean: 0.45 ± 0.70 , median: 0, mode: (0) out of a possible 4.0. Among the 147 considered knowledgeable, the majority 117 (79.6%) knew that contact lens was a small lens directly placed on the eyeball but only 57 (38.8%) knew it could be used to correct vision (Table 2). Results of logistic regression analysis shown in Table 1 shows that factors associated with knowledge of contact lens wear among spectacle wearers included age ($p = 0.029$), and number of changes of spectacle lenses ($p = 0.003$).

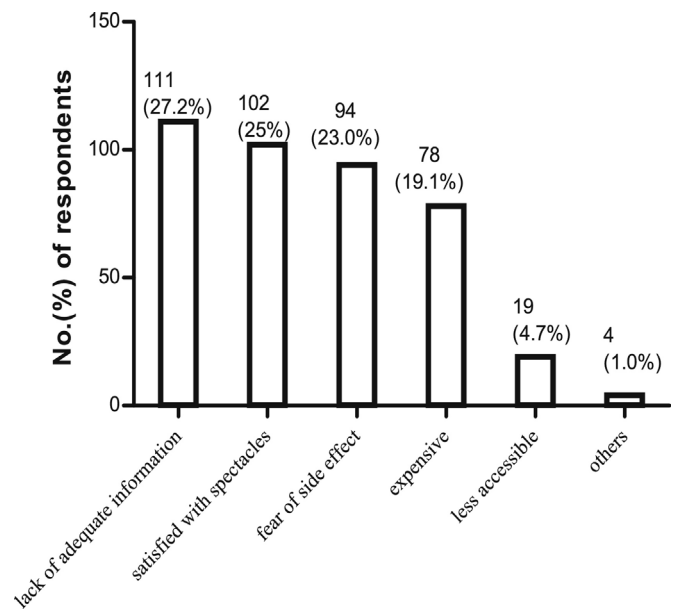
Although the number of males who knew of contact lens wear was higher than females, this difference was not found to be significant (OR: 1.23, 95% CI: 0.68–2.23). Ninety-four (64.0%) of the spectacle wearers who knew of contact lens wear were in the age range 18–30 years. Spectacle wearers aged 41–50 years were significantly less likely (OR: 0.19, 95% CI: 0.04–0.90) to know of contact lens wear compared to those aged 20 years and below. Also, spectacle wearers that had changed their spectacle lenses 6–10 times and more were significantly more likely to know of contact lens wear than their counterparts that had never changed their spectacle lenses. Other characteristics including the spectacle wearers’ educational status, occupation, refractive status, presence of astigmatic correction, presence of near correction and spectacle wear duration were not significantly associated ($p > 0.05$) with knowledge of contact lens wear.

3.3. Usage and barriers toward contact lens wear

The practice of contact lens wear among the spectacle wearers was poor with only 14 (3.3%) reporting of using contact lenses in addition to their glasses (Table 2). Fig. 2 shows that among those who have never worn a contact lens, the barriers commonly reported by them were: lack of adequate information 111 (27.2%) satisfaction with spectacles 102 (25.0%), fear of side effects 94 (23.0%) and cost involved 78 (19.1%).

3.4. Mean scores in knowledge by different sources of contact lens education

Of the 147 who knew of contact lenses, the majority reported receiving their education mainly from sources including eye care practitioners 40 (27.2%), family/friends 33 (22.4%) and contact lens wearers 24 (16.3%). It was found that the level of knowledge of contact lens wear by participants did not differ significantly across the different



Barriers to contact lens wear

Fig. 2. Barriers associated with contact lens wear in spectacle wearers.

Table 3
Mean scores for knowledge by different sources of education.

Sources of education	No.	Mean (± SD)	p-Value
Practitioner	40	1.45 ± 0.68	0.593
Family/friend	33	1.24 ± 0.56	
Contact lens wearer	24	1.25 ± 0.44	
TV	5	1.20 ± 0.45	
Radio	6	1.17 ± 0.41	
Read	21	1.38 ± 0.59	
Movie	16	1.19 ± 0.40	
Others	2	1.00 ± 0.00	
Total	147	1.31 ± 0.56	

sources of education (Kruskal–Wallis, $p = 0.593$; Table 3).

4. Discussion

Effort in promoting contact lens wear, especially in developing countries, is likely to be most effective when informed by an awareness of those factors affecting the choice between contact lenses and other refractive correction modalities. Unarguably, knowledge is a very important determinant of the health behavior of an individual, and, therefore, health education is regarded as an effective tool for health promotion [24]. Based on evidence from available literature, this is the first study to investigate factors responsible for low contact lens usage in a Ghanaian population, and currently is one with the largest number of study participants across the sub-Saharan region.

According to the results of this survey, about one-third (34.8%) of the population of spectacle wearers had knowledge of contact lens wear. Outcomes of surveys in different populations in low income settings assessing knowledge on the any of refractive correction modalities have consistently reported inadequate knowledge in their study populations. A study of 214 spectacle wearers in Nigeria reported that less than half (45.8%) of its study population was aware of contact lenses as an alternative to spectacle wear [22]. Also, in a non-spectacle wearing population in Iran with similar socioeconomic settings as Africa, it was found that the study participants showed poor awareness of contact lenses (19.7%) [25]. Another study in a non-spectacle wearing population in rural central India reported that only about half

of its participants knew that contact lenses could be used for correcting vision [26].

The proportion of the study participants reporting of contact lens usage was 3.3%. This result may not be surprising considering that participants' knowledge of contact lens wear was also low. In fact, a study by Kumar et al. demonstrated the close relationship between knowledge and positive health behavior through health promotion [24]. Other than the knowledge of contact lenses, the barriers to contact lens wear in this study population could also account for the low contact lens usage. Some of the barriers that featured prominently, and which have been consistently reported, were lack of adequate information, fear of side effects and cost [25,26]. Inadequate information by eyecare providers could arise since few eyecare practitioners cater for the needs of large numbers of ophthalmic patients, resulting in little contact time for face-to-face patient education. Another important reason for which eyecare providers may not actively promote contact lens wear to their patients could be related to hygiene or costs. There was a wide socio-economic range of people in this study population, which may not all have access to clean water and proper storing places for their contact lenses. In addition, an eye care provider may not mention contact lenses to persons not considered to be good candidates for contact lens wear. Whereas cost is commonly reported as one of the major barriers to contact lens wear in developing settings [25,26], there is dearth of information available to estimate the annual costs for a typical wearer to serve as indicator of contact lens affordability. There may be the need for a survey to be conducted across various contact lens practices in Ghana to determine the average cost for prescription contact lenses and its affordability. A unique barrier to contact lens wear noted in this study was satisfaction with vision through current spectacles. Evidence supports that visual functions during spectacle wear are not better than that of contact lenses in refractive conditions [27], and that in some instances contact lenses are the preferred refractive correction mode [14–16]. Perhaps their lack of visual experience through contact lenses was behind their contentment with spectacles. Provision of trial contact lenses to persons found to be good contact lens candidates may better equip them to make informed choices based on their personal experience with contact lenses.

It was found that age and number of times spectacles had been renewed by the participant were significantly associated with knowledge of contact lenses. The results show that spectacle wearers aged above 40 years were less likely to know of contact lens as compared to the younger adult age groups. Generally, young adults may be more fashion conscious, and explore alternative ways of vision correction that may be more appealing. In fact, studies in the developed economies have found contact lens wear to be higher in young populations compared to the elderly [28,29]. Also, the finding that higher number of renewals of spectacles was associated with higher odds of having knowledge of contact lens wear perhaps is because there were more visits to eyecare practitioners for spectacles to be changed which increased the chance of receiving contact lens education from their eyecare provider.

While a higher proportion of participants (66.0%) with knowledge of contact lens wear received their education through direct verbal instruction (eye care practitioners, family/friends, other contact lens wearers), the level of knowledge of contact lens wear did not differ depending on the source or mode of delivery. It could, therefore, be inferred from this study that dissemination of printed educational materials to patients with refractive errors could be beneficial, although the few existing studies on the effect of passive dissemination of print materials on patient outcomes are contradictory [30–32]. This finding may be of greater interest to practitioners in developing settings such as Africa, where few eye care practitioners cater for the needs of large numbers of ophthalmic patients.

4.1. Limitations

Some limitations must be acknowledged due to the use of both self-administration and an interviewer for completion of the questionnaires, as well as the absence of a word for contact lens in the Fante language, which could affect knowledge of contact lenses in this population. The inclusion of illiterates and persons with lower educational levels into the study was necessary to reflect the diversity of the general spectacle-wearing population. Also, the accessibility to contact lens services in those used eyecare facilities and/or Cape Coast could affect the outcome of the study. Even though Cape Coast is endowed with 5 eyecare clinics to serve the eye and vision needs of its population, only the Optometry Clinic of the University of Cape Coast currently offers contact lens services to its clients, probably because the others lack the needed equipment for that purpose. However, the findings of this study could mirror, to a large extent, that of the Ghana population since accessibility to contact lenses and refractive error distribution reported across the different regions of the country are similar. A recent report from a survey of optometric practices in Ghana suggests that over 60% of eyecare centers had no a keratometer [26].

5. Conclusion

Knowledge and usage of contact lenses among spectacle wearers was low. Contact lens education and demonstration of visual performance through fitting of trial contact lenses on potential candidates may help overcome barriers to contact lens wear.

Competing interests

The authors declare no competing interests in any mentioned product and publication of this article.

Authors' contributions

SA, HO conceived the study idea. SA and GOM participated in the study design and conduct of data collection. SA, GOM and AI carried out statistical analysis. All authors were involved in writing and review of the content of the manuscript for publication. All authors read and approved the final manuscript.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [10.1016/j.clae.2017.05.006](https://doi.org/10.1016/j.clae.2017.05.006).

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