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Contact lens complications among wearers in Ghana

Emmanuel Kobia-Acquah^{a,*}, Prince Kwaku Akowuah^{a,b}, Ellen Konadu Antwi-Adjei^a, Philip Mensah Forkuo^a, Nana Yaa Koomson^a, Samuel Odoi Odotei^a, Emmanuel Alabi^c, Richard Donkor^d

^a Department of Optometry and Visual Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

^b College of Optometry, University of Houston, Houston, TX, United States

^c Center for Visual Science, University of Rochester, Rochester, NY, United States

^d School of Optometry and Vision Science, University of Waterloo, Canada

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ABSTRACT

Purpose: Contact lens (CL) practice is relatively new in Ghana; a country where the geographical location (warm climate) lends itself to harsh environmental conditions (high humidity) known to influence CL wear. Recent studies suggest an increase in CL wear (corrective and cosmetic), yet, there are no studies about CL-related complications. This study sought to determine the complications associated with CL wear in Ghana.

Methods: This was a retrospective cohort study. The medical records of contact lens wearers from five CL clinics in the two largest metropolises in Ghana, Accra and Kumasi, were reviewed. Included in the study were records of individuals who visited the clinics within the period of 2013–2016. Data on patients with contact lens-related complications were analyzed.

Results: The prevalence of CL complications was 29.06 %. The mean \pm SD age of patients with CL complications was 35 \pm 15 years. Contact lens complications were more common in females (52.90 %). The majority of complications were in soft contact lens wearers (82.35 %). Refractive error correction was the most common indication for CL wear (61.76 %) among those with complications, followed by keratoconus (14.71 %), scarred blind eye (14.71 %), corneal ulcer (5.88 %) and anterior staphyloma (2.94 %). Contact lens complications reported were giant papillary conjunctivitis (41.18 %), corneal infiltrates (23.53 %), bacterial keratitis (14.71 %), corneal abrasion (11.76 %), dry eye (5.88 %) and corneal oedema (2.94 %). The causes of CL complication were inappropriate lens cleaning (29.41 %), poor hygiene (23.53 %), overnight contact lens wear (17.64 %), poor lens fit (14.71 %) and reaction to contact lens solution (14.71 %).

Conclusion: Contact lens complications were more common in soft contact lens wearers in Ghana. Giant papillary conjunctivitis was the most common contact lens complication reported. Adherence to CL wear care regimen and good personal hygiene may prevent the majority of CL complications observed in Ghana.

1. Introduction

Contact lenses have a variety of uses, the most common being refractive error correction [1,2]. Although, contact lenses are considered to provide superior vision compared to spectacle lens [3,4] and improve self-perception [5], complications associated with contact lens wear remain a primary concern. Ocular complications due to contact lens wear is a common occurrence, with prevalence estimates ranging from 5 % to 50 % [6–10]. Factors associated with contact lens-related

complications include patient related factors such as adherence with the prescribed lens care regimen and personal hygiene [7,8] and climatic conditions such as high temperatures and humidity [11,12]. Common contact lens related complications include papillae, corneal abrasions, conjunctival injection, keratitis, corneal oedema and corneal vascularization [6,11–13].

Compared to other countries [14–17], contact lens wear in Ghana is relatively low. However, there has been a slight increase in the number of contact lens wearers in Ghana over the years, with the only available

* Corresponding Author at: Kwame Nkrumah University of Science and Technology, Department of Optometry and Visual Science, Private Mail Bag, University Post Office, Kumasi, Ghana.

E-mail addresses: ekobiaacquah.cos@knust.edu.gh (E. Kobia-Acquah), pkakowua@central.uh.edu (P.K. Akowuah), ellennaky@yahoo.com (E.K. Antwi-Adjei), koomiphil@gmail.com (P.M. Forkuo), maamekay40@yahoo.com (N.Y. Koomson), samueldotei12@gmail.com (S.O. Odotei), ealabi@ur.rochester.edu (E. Alabi), rdonkor@uwaterloo.ca (R. Donkor).

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data estimating a 3.30 % prevalence of contact lens wear among spectacle wearers in Ghana [18]. The low prevalence of contact lens wear in Ghana may be due to a combination of lack of contact lens services [19] and the low patronage of available contact lens services. Reasons for low contact lens patronage in Ghana include a fear of possible side effects of contact lens, satisfaction with spectacle correction and lack of information about contact lens availability, use and benefits [18].

Despite the relatively low proportion of contact lens wear in Ghana, there is legitimate concern about the development of ocular complications of contact lens wear due to Ghana's geographical location and climate. Ghana is in the tropical climate zone, with high temperatures and humidity, conditions known to negatively affect contact lens wear [11,12]. Previous studies evaluating prevalence of contact lens-related ocular complications have been conducted in different countries [6–9], but no such study has been conducted previously in Ghana. Consequently, this study used a retrospective approach to evaluate contact lens complications in Ghana.

2. Methods

This was a retrospective cohort study. The available medical records of contact lens wearers from five contact lens clinics in the two largest metropolises in Ghana, Accra and Kumasi metropolises, were reviewed.

Included in the study were records of all existing contact lens wearers who visited the five contact lens clinics within the period of 2013–2016. Contact lens wear was defined as use of contact lens for any ocular condition for any length of time. Contact lens-related complication was defined as any ocular condition directly caused by contact lens wear. Contact lens wearers with ocular conditions not diagnosed as being caused by the contact lens wear were not counted as cases of contact lens complication. Patient data of interest were age, sex, type of contact lens, indication for contact lens wear, duration of contact lens wear, contact lens wear complication and cause of complication.

The study was approved by the Board of the Department of Optometry and Visual Science, Kwame Nkrumah University of Science and Technology. Permission was obtained from the authorities of the various eye clinics, namely: Robert and Sons Limited (Accra and Kumasi branches), Innes Eye and Vision Care Centre (Accra and Kumasi branches) and Sight for Africa Eye Clinic (Accra). The study conformed to the tenets of the Declaration of Helsinki.

Data was analyzed with STATA version 12.0 (StataCorp. 2011. College Station, TX: StataCorp LP.). Only data on patients with contact lens-related complications were analyzed and presented in the results. Quantitative data was described using the sample mean and standard deviation while qualitative data was described with proportions. Binary logistic regression analyses were performed to determine possible factors associated with the two most commonly reported complications associated with contact lens wear: giant papillary conjunctivitis and corneal infiltrates. A p-value of ≤ 0.05 was considered statistically significant.

3. Results

A total of 117 patient records were reviewed and 34 presented with contact lens-related complications. This gives a prevalence of contact lens-related complications of 29.06 %. The mean \pm SD age of patients was 35 ± 15 years. 52.90 % of contact lens complications were observed in females. All patients were prescribed daily wear contact lenses. The majority (82.35 %) of contact lens complications were in soft contact lens (SCL) wearers. Refractive error correction was the most common indication for contact lens wear (61.76 %) among those with complications, followed by keratoconus (14.71 %), scarred blind eye (14.71 %), corneal ulcer (5.88 %) and anterior staphyloma (2.94 %). The majority of patients with complications (85.29 %) had worn their contact lens for 3 months or less. A complete description of

Table 1
Demographic Distribution of Patients with Contact Lens Complications.

Characteristics		Number of Participants [N (%)]
Gender	Male	16 (47.10)
	Female	18 (52.90)
Age	< 20	4 (11.76)
	20–29	14 (41.18)
	30–39	6 (17.65)
	40–49	7 (20.59)
	> 49	3 (8.82)
Type of contact lens	Soft	20 (58.82)
	Refractive correction	
	Bandage	2 (5.88)
	Cosmetic	6 (17.65)
Indication for contact lens wear	Rigid Gas Permeable	6 (17.65)
	Refractive error	21 (61.76)
	Corneal ulcer	2 (5.88)
	Keratoconus	5 (14.71)
	Anterior staphyloma	1 (2.94)
Duration of contact lens wear before first reported complication	Scarred blind eye	5 (14.71)
	< 1 month	14 (41.17)
	1-3 months	15 (44.12)
	> 3 months	5 (14.71)

Table 2
Contact Lens Complications.

Complication	SCL [n (%)]	RGP [n (%)]	TOTAL [n (%)]
Giant papillary conjunctivitis	12 (35.30)	2 (5.88)	14 (41.18)
Corneal infiltrates	7 (20.59)	1 (2.94)	8 (23.53)
Corneal edema	1 (2.94)	0 (0.0)	1 (2.94)
Bacterial keratitis	5 (14.71)	0 (0.0)	5 (14.71)
Corneal abrasion	2 (5.88)	2 (5.88)	4 (11.76)
Dry eye	1 (2.94)	1 (2.94)	2 (5.88)
Total	28 (82.35)	6 (17.65)	34 (100.00)

*SCL – Soft contact lens; RGP – Rigid gas permeable; n (%) represents number and percentage of cases.

Table 3
Causes of Contact Lens Complications.

Cause	Number of Cases [N (%)]
Reaction to contact lens solution	5 (14.71)
Poor hygiene	8 (23.53)
Overnight contact lens wear	6 (17.64)
Inappropriate lens cleaning/ use of lens solution	10 (29.41)
Poor lens fit	5 (14.71)
Total	34 (100)

relevant patient characteristics is given in [Table 1](#).

The most common contact lens complication reported was giant papillary conjunctivitis (41.18 %) followed by corneal infiltrates (23.53 %) and bacterial keratitis (14.71 %); the least reported complication was corneal edema (2.94 %) ([Table 2](#)).

Poor hygiene and inappropriate lens cleaning/use of lens solution were the major causes of contact lens complications in this study accounting for over half (52.94 %) of the cases reported ([Table 3](#)).

Binary logistic regression was used to determine possible associations between patient characteristics and the top two complications reported in this study; giant papillary conjunctivitis and corneal infiltrates. No significant associations were observed between giant papillary conjunctivitis ([Table 4](#)) or corneal infiltrates ([Table 5](#)) and patient characteristics.

Table 4
Binary Logistic Regression Analysis for Factors Associated with Giant Papillary Conjunctivitis.

Factor	Odds ratio	p-value
Age	1.89	0.71
Gender	1.20	0.82
Type of contact lens	0.76	0.55
Duration of wear	1.17	0.64

Table 5
Binary Logistic Regression Analysis for Factors Associated with Corneal Infiltrates.

Factor	Odds ratio	p-value
Age	1.20	0.66
Gender	2.27	0.40
Type of contact lens	0.38	0.20
Duration of wear	0.79	0.59

4. Discussion

To the best of our knowledge, this is the first publication on contact lens-related complications in Ghana. The prevalence of contact lens-related complications was 29.06 %. Contact lens complications observed were giant papillary conjunctivitis (41.18 %), corneal infiltrates (23.53 %), bacterial keratitis (14.71 %), corneal abrasion (11.76 %), dry eye (5.88 %) and corneal oedema (2.94 %). The causes of contact lens complications were inappropriate lens cleaning/use of lens solution (29.41 %), poor hygiene (23.53 %), overnight contact lens wear (17.64 %), poor lens fit (14.71 %) and reaction to contact lens solution (14.71 %).

Compared to similar studies on contact lens complications [6,8,20], the prevalence of contact lens complications in this study was low. A reason for this might be that not all contact lens wearers experiencing complications seek eye care. A recent study by Ocansey et al. [21] reported that out of the individuals who responded to having a previous contact lens wear symptom, only about half of them had follow up visits to their eye care professionals. Also, the number of records analyzed in the current study was low compared to other studies [8,22] due to the low level of contact lens wear in Ghana (3.30 % prevalence of contact lens wear among spectacle wearers) [18]. This is low compared to countries like the United States [14] and Singapore [15], where prevalence estimates of contact lens wear of 13.91 % and 9.0 % respectively have been reported. The low prevalence of contact lens wear in Ghana may be due to both a lack of contact lens services and low patronage of available contact lens services. Only an estimated 10.20 % of optometrists in Ghana provide contact lens services [19], indicating a need for more contact lens services in Ghana. Barriers to patronage of available contact lens services in Ghana include a fear of possible side effects of contact lens, satisfaction with spectacle correction and lack of information about contact lens availability, use and benefits [18].

Over half (52.90 %) of contact lens wear complication cases were reported in females. This might be because in Ghana [21] and in general [23,24] females tend to patronize contact lenses more than males and as such there is a tendency for a higher number of reported complication cases in females than in males. Also, females generally have a better health seeking behavior than males [25–28] and so might be more likely to report any uncomfortable contact lens related event than males. This will result in a higher number of reported contact lens-related complications in females than in males. In the current study, the majority (52.94 %) of contact lens complications was reported in patients < 30 years, consistent with other studies [23,29]. Individuals in this age group have been associated with increased non-compliance with contact lens care regimen [30,31]. Similar to other studies [8,20],

the majority (82.35 %) of the contact lens-related complications were reported in soft contact lens wearers, most likely due to soft contact lenses being the most common type of contact lens worn in Ghana [21]. Refractive correction was the most common indication for contact lens wear in this study accounting for 61.76 % of contact lens wear. This is in agreement with the report that the main indication for contact lens use in Ghana is refractive correction [21]. Over 80 % of contact lens-related complications occurred in the first three months of contact lens wear. This emphasizes the importance of follow up visits within the first three months of contact lens wear [32]. Two to three follow up visits within the first three months of contact lens wear is recommended. This is to ensure that contact lenses are worn and handled appropriately and ocular health is being preserved [32–34].

The top three contact lens complications reported in this study were giant papillary conjunctivitis (41.18 %), corneal infiltrates (23.53 %) and bacterial keratitis (14.71 %). Giant papillary conjunctivitis is a common contact lens complication. Nagachandrika et al. [7] and Sapkota et al. [10] both reported giant papillary conjunctivitis as the most common contact lens-related complication accounting for 31.05 % and 36.90 % of complications respectively. In agreement with our finding, other studies have reported corneal infiltrates to be a common ocular complication of contact lens wear [6,22]. Aldebasi et al. [6] reported the prevalence of corneal infiltrates among soft contact lens wearers to be 9.57 %, compared to 20.59 % in the current study. Compared to these two studies, the percentage of corneal infiltrates appears to be high in our study. Accounting for the difference between our study and that of Aldebasi et al. is the means of reporting the findings. Aldebasi et al. reported prevalence of corneal infiltrates in SCL wearers only while we reported the proportion of contact lens complications contributed by corneal infiltrates. Binary logistic regression revealed that none of the participants' characteristics used in the analysis were associated with giant papillary conjunctivitis and corneal infiltrates, the top two contact lens related complications reported in this study.

Bacterial keratitis has been reported by numerous studies to be a common complication of contact lens wear. Teo et al. [22] reported that infective keratitis was the most common contact lens-related complication accounting for 25.60 % of cases. Although the study by Teo et al. and the current study were both conducted in tropical regions, the prevalence of bacterial keratitis found in this study (14.71 %) was lower than that found in the study by Teo et al. This could be because the current study only reported bacterial keratitis whereas the study by Teo et al. reported bacterial keratitis and other forms of infective keratitis. Further, the study by Teo et al. was conducted in a tertiary center so may have recorded a higher number of cases compared to the current study which was conducted in private eye care centers. Contact lens wear is an established risk factor for development of bacterial keratitis, with some studies reporting contact lens wear as the main risk factor for bacterial keratitis [35–37]. Bacterial keratitis in contact lens wear is high in tropical and semitropical regions [11]. Given that Ghana is in the tropical zone, bacterial keratitis complication in contact lens wear is an expected finding.

The top three causes of contact lens related complications in our study were inappropriate lens cleaning/use of lens solution (29.41 %), poor hygiene (23.53 %) and overnight contact lens wear (17.64 %). These are well established risk factors for contact lens complications such as microbial keratitis and corneal infiltrates [38–40]. Lim et al. [39] reported a 4 times higher risk of contact lens wear complications in individuals who wore their contact lens overnight and a 13 times higher risk in individuals with poor hygiene. Stapleton et al. [40], also reported a 1.8 times higher odds of contact lens complications for both overnight lens wear and poor hygiene. Strict adherence to contact lens wear care regimens, good personal hygiene, and reinforcing no overnight lens wear would go a long way to prevent most contact lens complications.

Projecting results from the current study to the larger Ghanaian population, it is expected that similar figures would be obtained for

contact lens-related complications from the general contact lens population. There is a well-established bias in the rural-urban distribution of eye care personnel and eye care facilities in Ghana [41–43], with eye care services provided mostly by ophthalmologists and optometrists in larger cities and towns. Over 70 % of ophthalmologists and optometrists (eye care personnel most likely to provide contact lens services) are in the Accra and Kumasi metropolises alone. Contact lens services in Ghana also tend to be mostly offered by private eye clinics with a vast majority of them located in the Accra and Kumasi metropolises [43]. For these reasons, it can be reasonably assumed that the majority of contact lens wearers are in the two metropolises considered in the current study. As such the results of the current study most likely reflects the situation in Ghana. However, it would still be interesting to have information on the contact lens wear “minority”, especially in the Northern part of Ghana as the weather there tends to be unusually warm, humid and dusty.

A limitation of the current study was its retrospective nature. Since patient data had already been collected, the scope of information that could be obtained from the patient records was limited. For instance, it would have been interesting to analyze data on prevalence of contact lens complication and wearing modality as well as contact lens material, however, these were not always available. We also had to assume that all information obtained from medical records of patients were accurate. A significant limitation was the small number of contact lens wear cases obtained which could have accounted for some of the differences found between the current and other similar studies.

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Declaration of Competing Interest

All authors have no conflict of interest to declare.

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