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Knowledge, attitude and practice of eye care professionals in Kenya on atropine prescription for myopia progression in children aged 4–12 years

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ABSTRACT

BACKGROUND: Myopia has predominantly been shown to negatively impact ocular health and quality of life. However, with a variation in the scope of practice for eye care professionals destined to address myopia, this study intended to assess the knowledge, attitude, and practice of different eye care professionals in Kenya regarding atropine prescription for the management of myopia progression in pediatric patients aged 4–12 years.

MATERIAL AND METHODS: A cross-sectional mixed-method study was conducted among ophthalmologists, optometrists, and ophthalmic clinical officers practicing in Kenya's private and public health sectors. Initially, purposive sampling and then snowball sampling were used to recruit the participants. Data was collected via an online survey which consisted of closed-ended questions aiming to explore the eye care professional's knowledge, attitude, and practice regarding prescribing different concentrations (0.01%, 0.025%, and 0.05%) of atropine for pediatric myopes. In addition, a semi-structured interview was conducted telephonically from April to June 2023.

RESULTS: All participants (100%) were aware of 1% atropine and utilized it often for pediatric refractions. A composite awareness score revealed ophthalmologists specializing in pediatrics at the top in terms of having good knowledge of atropine prescription for children with myopia progression, followed by general ophthalmologists, optometrists, and ophthalmic clinical officers. The attitude of all pediatric ophthalmologists towards the prescription of atropine for pediatrics with progressing myopia was better when compared to optometrists, ophthalmic clinical officers, and general ophthalmologists. All pediatric ophthalmologists prescribed atropine for children with myopia progression, while other cadres, such as optometrists and general ophthalmologists, utilized atropine primarily for pediatric refraction.

CONCLUSION: Atropine is predominantly used by eye care professionals in Kenya for pediatric refraction, with minimal usage as a management option for myopia progression. Continuous medical education is thus desirable among eye care professionals on the use of atropine to monitor and manage myopia progression in children. Furthermore, developing a pediatric refraction guideline integrating a clinical-based utilization of low concentrations of atropine is desirable.

KEY WORDS: atropine; knowledge; attitude; practice; eye care professionals; pediatrics; myopia; myopia progression; children

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INTRODUCTION

Myopia is currently a major public health concern across the world, and it is estimated that by 2050, almost half of the world's population will suffer from myopia [1]. Even though evidence shows that East and Southeast Asian countries such as China and Singapore are at a greater risk of developing myopia, management of the condition remains the same across the world [1, 2]. Eye care professionals should be at the forefront of exerting efforts to enhance awareness of myopia control and management among the general population. Although myopia could be addressed by a simple pair of spectacles, if uncorrected and left to progress, it can lead to conditions such as myopic retinopathy, retinal detachment, and glaucoma [3]. Atropine at low concentrations has been shown to be safe and effective in slowing myopia progression in children of Chinese ethnicity [4]. Recently, it was demonstrated in a study of 400 myopic children from Singapore that daily atropine 0.01% eye drops reduced the annual increase in the mean spherical equivalent of refraction (SER) compared to the placebo arm of a prior study [5]. Therefore, to address this burden, eye care professionals should be knowledgeable enough to advocate for the prescription of atropine for children with myopia progression. In Kenya, the prevalence of visual impairment based on presenting visual acuity value among children is approximately 2.4 ± 0.7% [6]. It would thus be interesting to ascertain the knowledge, attitude, and practice of eye care professionals in Kenya regarding the use of atropine as a diagnostic and therapeutic tool for myopia progression.

The scope of practice for eye care professionals in Kenya varies depending on specialization and duration of training [7]. In Kenya, different categories of eye care professionals undertake different roles, including refractive error service delivery. While the scope of practice of only ophthalmologists, optometrists, and ophthalmic clinical officers allows them to engage in refractive error service delivery, the limited human resource in the eye health ecosystem has resulted in the extension of roles to other cadres, such as ophthalmic nurses to undertake refraction [8]. Although the commonest corrective approach for myopia in Kenya is contact lenses and spectacles, other approaches, such as refractive surgery, also exist. With the global burden of myopia [9], eye care professionals should be at the forefront in monitoring it and knowledgeable on evidence-based options to slow its progression. However, little information currently exists on whether all eye care professionals undertaking refraction in Kenya routinely check for the progression of myopia among children and the methods used to manage any such progression.

Although spectacles are suitable for addressing myopia, evidence exists for the prescription of atropine 0.01%, 0.025%, and 0.05% in children for slowing down myopia progression [10, 11]. With a projection of approximately 49.8% of the global population suffering from myopia by 2050 with 9.8% cases of high myopia [12], eye care professionals' attitude towards implementing evidence-based approaches is desirable to slow myopia progression and improve quality of life. To facilitate this, a pediatric refractive error management guideline is desirable to act as a baseline for all eye care professionals engaged in refractive error management. However, such a guideline does not exist in Kenya, warranting the need to assess the attitude and practice of existing eye care professionals on atropine prescriptions for pediatric myopes.

The study rationales were based on the fact that with the increasing prevalence of myopia globally [9, 13], eye care professionals' knowledge of different clinical approaches inclined towards addressing myopia progression among children is desirable. Furthermore, given the paucity of information on the attitude and practice among eye care professionals in Kenya on atropine prescription to slow down myopia progression in children, this study is desirable. Additionally, with the absence of a pediatric refraction guideline for utilization by eye care professionals in Kenya, this study will highlight the need to develop such guidelines for utilization by eye care professionals.

MATERIAL AND METHODS

This cross-sectional mixed-method study was conducted among eye care professionals operating as functional clinical refractionists practicing in private and public health sectors in different parts of Kenya. An online survey, with an invitation for participation, was sent to the representatives of the associations of optometrists, ophthalmologists, and ophthalmic clinical officers to share on their official pages with the registered members. The survey comprised semi-structured questions on the category of eye care professionals, frequency of refraction, and any specialty. All the eye care professionals who responded to the survey were included to partici-

pate in the study. Respondents to the survey were subsequently contacted telephonically with a brief description of the study and invited to participate in a telephonic interview. Informed consent was obtained via Whatsapp thereafter.

The interview was conducted telephonically with 139 eye care professionals from April-June 2023. The interview schedule consisted of closed- and open-ended questions aiming to explore eye care professionals' knowledge, attitude, and practice on prescribing low-concentration atropine for pediatric myopes. Information of interest was the socio-demographic characteristics, knowledge of uses of different concentrations of atropine, and attitude, as well as the practice of eye care professionals on atropine prescription to slow the progression of myopia among children. The interview schedule had eleven structured questions focussed on respondents' demographic characteristics (3 questions), knowledge of atropine (5 questions), attitude on atropine prescription (1 question), and practice on atropine prescription for pediatric children (2 questions). The constructs around knowledge included concentration of atropine, uses of atropine among children, atropine concentration for slowing myopia progression, checking myopia progression among children, and the method for checking myopia progression. The questions had three possible responses, namely: "aware," "neutral," and "not aware," on a three-point Likert scale. The interview schedule lasted approximately 15 minutes. A composite scale ranging from 20 to 100 was adopted with knowledge, attitude, and practice levels categorized as low (score of 20–40), medium (score of 41–79), and high/good (score of 80–100)[14]. The telephonic calls were conducted at a convenient time, as the participants preferred. The data collection instrument was pretested among 15 eye care professionals. The eye care professionals included in the pilot study were not included in the actual study since they could influence the outcome of the study results. The reliability of the data collection instrument using Cronbach's alpha (0.80, 0.91, and 0.97 for knowledge, attitude, and practice, respectively) and validity using a Pearson correlation coefficient (0.000 < 0.05) was undertaken. Finally, the need for a pediatric children's guideline for refraction was evaluated. An open-ended question assessing the need for the guideline was posed to the respondents.

The quantitative data of all socio-demographic characteristics and the proportion of eye care professionals who identified all items related to attitude, knowledge, and practice were compared using a chi-square test. A multiple logistic regression analysis was conducted to compare the knowledge, attitude, and practice with demographic characteristics. The odds ratios (ORs) were calculated at 95% confidence intervals (CIs). For qualitative data, a thematic analysis was conducted to analyze the need to design a pediatric refractive error management guideline for Kenya. The Statistical Package for Social Sciences (SPSS) version 21 software was used to analyze the data. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Demographic characteristics of the participants

An online survey was sent to 275 eye care professionals. Out of the 275 eye care professionals who received the survey, 139 responded to the survey, which translated to a response rate of 50.5%. The mean age of the participants was 35.4 (SD 4.6) years, with just over half (n = 79; 56.8%) being male. Table 1 details the participants' demographic characteristics.

Knowledge of eye care professionals on myopia progression among children in Kenya

All participants (n = 100%) were aware of the 1% atropine and its use for refraction accuracy among children. The results are detailed in Table 2.

Association between demographic characteristics and knowledge of eye care professionals on atropine prescription for children

There was a statistically significant difference between the knowledge of pediatric ophthalmologists and other cadres ($p = 0.02$), suggesting that the scope of training related to myopia control for pediatric ophthalmologists is more comprehensive compared to other eye care professionals. Eye care professionals who had practiced for more than ten years had good knowledge of atropine for myopia control among children compared to those who had practiced for less than ten years. The results are shown in Table 3.

Attitude of eye care professionals on the use of atropine for myopia control among children

Table 4 details the attitude of eye care professionals on atropine and myopia control among children in Kenya.

Table 1. Demographic characteristics of the participants

Cadres	Sub-specialization	Age group	Average duration of practice	Employment sector	
				Private	Public
Ophthalmologists	General ophthalmologists (n = 21; 15.1%)	35–39 years	6 years	(n = 9; 6.5%)	(n = 12; 8.6%)
	Pediatric ophthalmologists (n = 12; 8.6%)	40–44 years	3 years	(n = 7; 5%)	(n = 5; 3.6%)
Optometrists	General optometrists (n = 59; 42.4%)	30–34 years	5 years	(n = 57; 41%)	(n = 2; 1.4%)
	Pediatric optometrists (n = 0; 0 %)	None	None	(n = 0; 0 %)	(n = 0; 0 %)
Ophthalmic Clinical Officers	General ophthalmic clinical officers (n = 63; 45.3%)	40–44 years	6 years	(n = 12; 8.6%)	(n = 51; 36.7%)
	Cataract surgeons (n = 16; 11.5%)	40–44 years	6 years	(n = 4; 2.9%)	(n = 12; 8.6%)

Table 2. Knowledge of eye care professionals on atropine and myopia control among children

Variables	General ophthalmologists	Pediatric ophthalmologists	General optometrists	General ophthalmic clinical officers	Ophthalmic clinical officers/ Cataract surgeons
Awareness of availability of atropine in different concentrations					
0.01%	(n = 19; 90.5%)	(n = 12; 8.6%)	(n = 8; 13.6%)	(n = 18; 28.6%)	(n = 3; 18.8%)
0.05%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 12; 20.3%)	(n = 21; 33.35)	(n = 7; 43.8%)
0.03%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 7; 11.95)	(n = 11; 17.5%)	(n = 1; 6.3%)
1%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 59; 42.4%)	(n = 63; 45.3%)	(n = 16; 11.5%)
Uses of atropine in children eye care					
Examination	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 59; 42.4%)	(n = 63; 45.3%)	(n = 16; 11.5%)
Lazy eye treatment	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 16; 27.1%)	(n = 9; 13.3%)	(n = 4; 25%)
Slow down the progression of myopia	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 9; 15.3%)	(n = 7; 11.1%)	(n = 2; 12.5%)
Concentration of atropine which can slow the progression of myopia					
0.01%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 8; 13.6%)	(n = 18; 28.6%)	(n = 3; 18.8%)
0.05%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 12; 20.3%)	(n = 13; 33.35)	(n = 5; 31.2%)
0.03%	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 7; 11.9)	(n = 11; 17.5%)	(n = 1; 6.3%)
1%	0%	0%	(n = 32; 54.2%)	(n = 21; 20.6%)	(n = 7; 43.8%)

Association between demographic characteristics and attitude of eye care professionals on atropine prescriptions for children

Table 5 details the association between demographic characteristics and the attitude of eye care professionals toward atropine prescription for children in Kenya

The practice of eye care professionals on atropine and myopia control among children

Table 6 details Practice of eye care professionals on atropine and myopia control among children in Kenya

Association between demographic characteristics and practice of eye care professionals on atropine prescription for children in Kenya

Table 7 details the association between demographic characteristics and practice of eye care professionals on atropine prescription for children in Kenya

Proposed education approach for eye care professionals on atropine prescription for progressing myopia

The proposed education approach for scaling awareness among eye care professionals is shown

Table 3. Association between demographic characteristics and knowledge of eye care professionals on atropine prescription for children

Cadres	Knowledge		OR (95% CI)	p-value
	Good	Low		
General ophthalmologists	(n = 19; 13.7%)	(n = 2; 1.4%)	0.5 (0.3–1.7)	
Pediatric ophthalmologists	(n = 10; 7.2%)	(n = 2; 1.4%)	0.6 (0.1–2.8)	0.02
General optometrists	(n = 17; 12.2%)	(n = 42; 30.2%)	0.3 (0.1–0.4)	0.01
General ophthalmic clinical officers	(n = 12; 8.6%)	(n = 51; 36.7%)	0.7 (0.4–0.9)	0.012
Cataract surgeons	(n = 4; 2.9%)	(n = 12; 8.6%)	0.34(0.21–0.46)	
Duration of practice				
1–10 years	(n = 36; 25.9%)	(n = 77; 55.4%)	0.61 (0.46–0.83)	0.02
> 10 years	(n = 17; 12.2%)	(n = 9; 6.5%)	0.72 (0.56–0.97)	
Age group				
30–34 years	(n = 31; 22.3%)	(n = 11; 7.9%)	0.37 (0.2–0.43)	0.013
35–39 years	(n = 19; 13.7%)	(n = 54; 38.8%)	0.52 (0.46–0.67)	
40–44 years	(n = 7; 5%)	(n = 17; 12.2%)	0.21 (0.16–0.32)	

OR — odds ratio; CI — confidence interval

Table 4. Attitude of eye care professionals on atropine and myopia control among children

Variables	General ophthalmologists	Pediatric ophthalmologists	General optometrists	General ophthalmic clinical officers	Ophthalmic clinical officers/Cataract surgeons
Have you ever been interested in checking for myopia progression among children?					
Yes	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 24; 17.3%)	(n = 13; 9.4%)	(n = 3; 2.2%)
No	(n = 2; 1.4%)	(n = 1; 0.7%)	(n = 35; 25.2%)	(n = 50; 36%)	(n = 11; 28.2%)

Table 5. Association between demographic characteristics and attitude of eye care professionals on atropine prescription for children

Cadres	Attitude		OR (95% CI)	p-value
	Good	Low		
General ophthalmologists	(n = 12; 8.6%)	(n = 9; 6.5%)	0.3 (0.2–0.4)	0.071
Pediatric ophthalmologists	(n = 10; 7.2%)	(n = 2; 1.4%)	0.5 (0.4–0.6)	
General optometrists	(n = 21; 15.1%)	(n = 38; 27.3%)	0.2 (0.1–0.3)	0.011
General ophthalmic clinical officers	(n = 12; 8.6%)	(n = 51; 36.7%)	0.31 (0.2–0.49)	0.018
Cataract surgeons	(n = 2; 1.4%)	(n = 14; 10.1%)	0.5 (0.44–0.68)	
Duration of practice				
1–10 years	(n = 47; 33.8%)	(n = 66; 47.5%)	0.1 (0.02–0.28)	0.037
> 10 years	(n = 14; 10.1%)	(n = 12; 8.6%)	0.45 (0.34–0.64)	
Age group				
30–34 years	(n = 3; 2.2%)	(n = 39; 28.1%)	0.33 (0.26–0.59)	0.023
35–39 years	(n = 17; 12.2%)	(n = 47; 33.8%)	0.58 (0.49–0.63)	
40–44 years	(n = 12; 8.6%)	(n = 21; 15.1%)	0.38 (0.27–0.43)	

OR — odds ratio; CI — confidence interval

Table 6. Practice of eye care professionals on atropine and myopia control among children in Kenya

Variables	General ophthalmologists	Pediatric ophthalmologists	General optometrists	General ophthalmic clinical officers	Ophthalmic clinical officers/Cataract surgeons
Do you always check for myopia progression among children					
Yes	(n = 19; 13.7%)	(n = 11; 7.9%)	(n = 8; 5.8%)	(n = 13; 9.4%)	(n = 3; 2.2%)
No	(n = 2; 1.4%)	(n = 1; 0.7%)	(n = 51; 36.7%)	(n = 50; 36%)	(n = 13; 9.4%)
Which of the following tests do you conduct for children					
Measurement of visual acuity	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 59; 42.4%)	(n = 63; 45.3%)	(n = 16; 11.5%)
Comprehensive ocular examination	(n = 21; 15.1%)	(n = 12; 8.6%)	(n = 47; 33.8%)	(n = 39; 28.1%)	(n = 7; 5%)
Cycloplegic refraction	(n = 12; 8.6%)	(n = 12; 8.6%)	(n = 39; 28.1%)	(n = 27; 19.4%)	(n = 8; 5.8%)
Period of outdoor activity	(n = 9; 6.5%)	(n = 10; 7.2%)	(n = 6; 4.3%)	(n = 4; 2.9%)	(n = 2; 1.4%)
Spherical equivalent every visit	(n = 9; 6.5%)	(n = 8; 5.8%)	(n = 4; 2.9%)	(n = 1; 0.7%)	(n = 1; 0.7%)
Which of the following approaches do you apply to check for myopia progression?					
Prescribe 0.01% atropine	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 1; 0.7%)	(n = 1; 0.7%)	(n = 0; 0%)
Prescribe 0.025% atropine	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 0; 0%)	(n = 0; 0%)	(n = 0; 0%)
Prescribe 0.05% atropine	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 1; 0.7%)	(n = 0; 0%)	(n = 0; 0%)
Prescribe 1% atropine	(n = 1; 0.7%)	(n = 0; 0%)	(n = 3; 42.4%)	(n = 1; 0.7%)	(n = 0; 0%)
Prescribe spectacles or contact lenses	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 19; 13.7%)	(n = 11; 28.2%)	(n = 3; 2.2%)

Table 7. Association between demographic characteristics and practice of eye care professionals on atropine prescription for children in Kenya

Cadres	Practice		OR (95% CI)	p-value
	Good	Low		
General ophthalmologists	(n = 7; 5%)	(n = 14; 10.1%)	0.55 (0.35–0.75)	0.015
Pediatric ophthalmologists	(n = 11; 7.9%)	(n = 1; 0.7%)	0.6 (0.4–0.74)	
General optometrists	(n = 3; 2.2%)	(n = 56; 40.3%)	0.3 (0.14-0.45)	0.04
General ophthalmic clinical officers	(n = 2; 1.4%)	(n = 61; 43.9%)	0.39 (0.27-0.46)	0.018
Cataract surgeons	(n = 2; 1.4%)	(n = 14; 10.1%)	0.53 (0.37–0.79)	
Duration of practice				
1–10 years	(n = 9; 6.5%)	(n = 104; 74.8%)	0.33 (0.27–0.49)	0.027
> 10 years	(n = 18; 12.9%)	(n = 8; 5.8%)	0.56 (0.39–0.89)	
Age group				
30–34 years	(n = 7; 5%)	(n = 35; 25.2%)	0.73 (0.57–0.99)	0.041
35–39 years	(n = 11; 7.9%)	(n = 53; 38.1%)	0.83 (0.68–1.29)	
40–44 years	(n = 13; 9.4%)	(n = 20; 14.4%)	0.43 (0.36–0.71)	

OR — odds ratio; CI — confidence interval

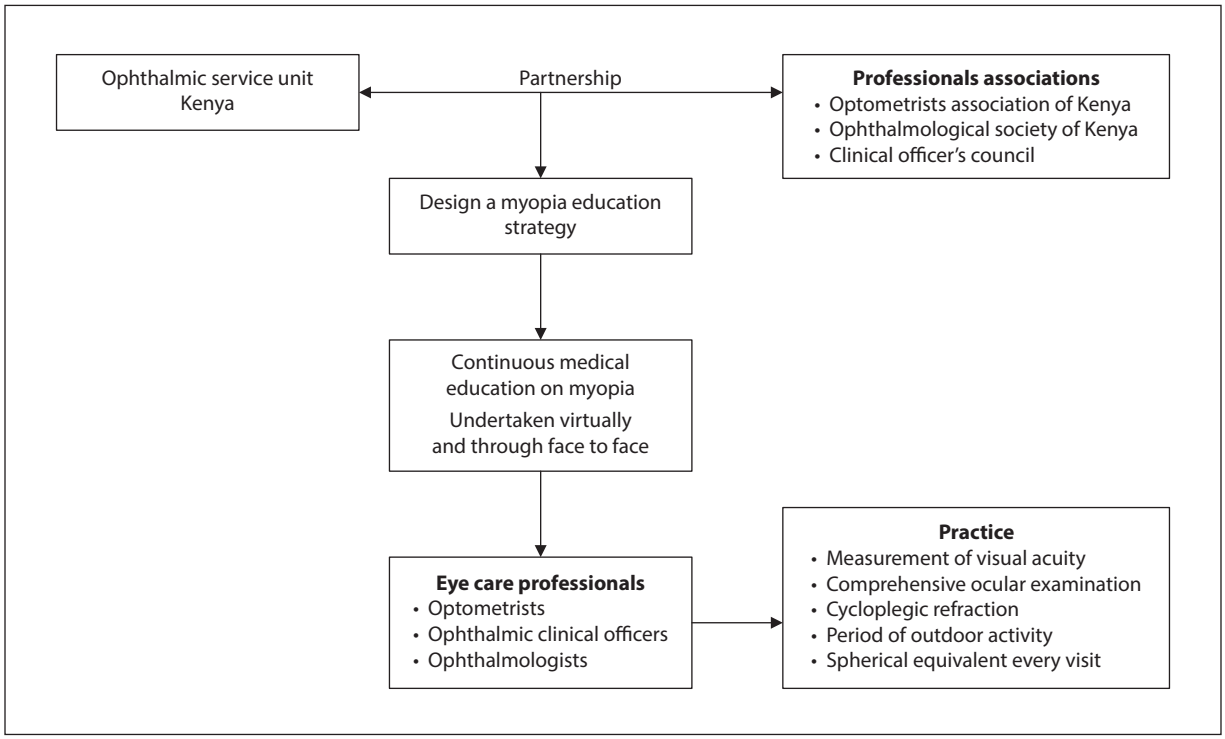

FIGURE 1. Proposed education approach for eye care professionals on atropine prescription for progressing myopia

in Figure 1. Co-management was considered holistic in the development of the proposed education approach.

All the eye care professionals (100%) agreed that scaling education on avenues for addressing myopia progression is worthy of attention among eye care professionals in Kenya (quotes 1, 2).

1. *I think the burden of myopia warrants a guideline and continuous medical education for utilization by eye care professionals in Kenya so that the required diagnostic drugs can be availed in both the private and public sectors for quality delivery* — Eye care professional #07
2. *For me, I think the quality of life of children being affected by myopia can be addressed early enough if eye care professionals practice the best approaches, including the emerging ones* — Eye care professional #126

All the eye care professionals (100%) agreed that the proposed approach has the potential to scale awareness among eye care professionals, which will, in turn, address progressing myopia among children. They argued that the approach would ensure that the eye care professionals advise the parents of children with progressing myopia on the need for atropine prescription in conjunction with the use of spectacles and/or contact lenses (quotes 3, 4).

3. *One of the main problems we have that makes myopia progress is the challenge of affordability hence through this approach, pediatrics who cannot afford spectacles will benefit from atropine prescription* — Eye care professional #078
4. *Mainly, this approach will skill the eye care professionals to prescribe atropine for patients who cannot afford spectacles, and this has been the main challenge which I think atropine can help if it really works* — Eye care professional #045

All of the eye care professionals (100%) agreed that virtual or face-to-face delivery is ideal as it will allow all the eye care professionals to access information on myopia progression among children at their convenience (quote 5).

5. *I think allowing the eye care professionals to acquire information through different avenues will potentially scale the reach due to convenience* — Eye care professional #031

All of the eye care professionals (100%) agreed that the recommendation on the holistic practice would act as a benchmark for eye care professionals and scale the assessment of progressing myopia among children (quote 6).

6. *With the current situation where a standard clinical baseline doesn't exist, the suggested approach is ideal* — Eye care professional #109

DISCUSSION

It is estimated that by 2050, half of the world's population will suffer from myopia [9]. Given the different presentations of myopia, children are at greater risk of developing myopia progression, warranting the need for the adoption of various approaches to control such progression. Recommendations such as encouraging children to engage in outdoor activities and reducing screen hours [15] have been shown to slow myopia progression among children. Hence, eye care professionals are at the forefront of scaling awareness of this concept. Our study has shown that the level of knowledge among pediatric ophthalmologists in Kenya remains good compared to other cadres, such as optometrists, ophthalmic clinical officers, and general ophthalmologists, on utilizing low-concentration atropine in controlling myopia among children. The practice among pediatric ophthalmologists is attributed to the fact that they specialize in children and have broader knowledge of pediatric ocular conditions and refractive error management.

Notwithstanding, there is no clear guideline on pediatric refractive error management in Kenya, which could be attributed to the low knowledge among eye care professionals on the utilization of atropine among children to slow the progression of myopia [16, 17]. Continuous medical education is desirable for addressing the low level of knowledge among eye care professionals in Kenya on atropine prescriptions for children with myopia. Therefore, in partnership with the associations of eye care professionals, the Ministry of Health should advocate for continuous medical education among eye care professionals to effectively address myopia progression among children in Kenya.

Establishing clear guidelines for eye care professionals to utilize in the management of myopia progression should be prioritized. With the burden of myopia [12], this study highlights the importance of establishing a pediatric refraction guideline for utilization by eye care professionals in Kenya. The motivation for this initiative is to ensure that facilities offering refractive error services to children equip and stock the refraction points with corrective devices and consumables like atropine for utilization by eye care professionals. Currently, there is a limited number of pediatric ophthalmologists who can attend to the growing population of pediatric patients, which warrants the need for scaling awareness of other eye care professionals on the need to monitor myopia progression. Therefore, the development of a pediatric clinical refraction guide is desirable to ensure that eye care professionals can practice within the required guidelines and bolster the quality of pediatric eye care. Furthermore, through the guidelines, evidence-based practices such as prescribing low-concentration atropine for pediatric myopes could potentially slow myopia progression and improve the quality of life of the affected individuals.

This study has established that most eye care professionals in Kenya utilize atropine 1% of the time for pediatric eye examinations. However, pediatric ophthalmologists only prescribe low-concentration atropine to slow down the progression of myopia. This implies that while the knowledge of eye care professionals on atropine 1% for refraction in children is good, the use of low-concentration atropine for management is lacking. According to Wei et al., 7, 0.01% atropine, if used overnight for three years then myopia progression may be addressed by a standard deviation of 0.26 (0.07) D, equivalent to a 34.2% reduction. This is a clear indication that low-concentration atropine can slow myopia progression among children and should be taken up by eye care professionals. Hence, the knowledge of eye care professionals on low-concentration atropine usage should be enhanced through practice to ensure that they can scale the knowledge to children and their parents on the need for different visits to rule out progressing myopia. Although this study denoted that many eye care professionals practicing within the private sector were not utilizing atropine for examination when compared to their counterparts within the public sector, a clinical guideline for pediatric refraction was deemed suitable to address this variation.

Environmental factors play a crucial role in the control of myopia. For instance, near work and education are key factors that should be prioritized to slow myopia progression among children [10, 11, 17]. However, most eye care professionals have stopped prescribing spectacles to myopes without follow-ups to rule out the type of myopia. This could be attributed to the current situation in Kenya, where eye care professionals have a weak interdisciplinary relationship, limiting education based on the training scope. As a result, eye care professionals should be at the forefront of scaling public awareness of myopia and the significance of atropine prescriptions for children with progressing myopia. Outdoor activities among children have been shown to play a crucial role in slowing myopia progression

among pediatric patients [15]. Yet, this study denoted that most eye care professionals are not disseminating this information, together with the need for regular eye examinations, to parents of pediatric myopes. This could be attributed to the absence of myopia control strategies designed by eye care professionals in Kenya, which is inclined towards enlightenment on the measures towards addressing progressing myopia. As a result, a guideline integrating aspects such as behavior change should be designed for utilization by eye care professionals in Kenya.

The findings of this study have shown that most eye care professionals, apart from pediatric ophthalmologists who have practiced for less than 5 years, had low knowledge of methods for detecting myopia progression among children compared to those who had practiced for more than 5 years. This is attributed to the fact that clinical refractionists, through experience and new knowledge, can diagnose myopia progression effectively since they attend continuous medical education and thus build on their existing knowledge. As a result, experienced eye care professionals should be at the forefront of educating their juniors on myopia control measures [18–20]. The study findings have also shown that prescribing low-concentration atropine among eye care professionals in Kenya remains low, with only pediatric ophthalmologists utilizing this avenue for myopia control. Therefore, with the significance of low-concentration atropine in slowing myopia progression among pediatric myopes, such emerging therapy should be practiced by eye care professionals in Kenya to address progressing myopia.

In Kenya, the prevalence of URE is estimated at 6.39% [21], while for children, the prevalence is estimated at 1.7% [6]. This implies that the prevalence of URE among children in Kenya is substantive, warranting the need for the adoption of control strategies such as atropine prescription. While evidence shows that URE negatively impacts the quality of life [22], children are adversely affected as they require good vision for their success in education. With over 72% of Kenyans living at the bottom of the economic pyramid [23], accessibility and affordability of RE services remain a major challenge that should addressed. As a result, eye care professionals should advocate for the utilization of the best methods to slow myopia progression across the economic pyramid [15, 24]. Our study has shown that the attitude of most eye care professionals in Kenya has not prioritized the prescription of atropine for children with myopia, with only pediatric ophthalmologists undertaking such an initiative for their pediatric patients. While countries such as China report high cases of myopia, eye care professionals are utilizing low-concentration atropine for children with myopia progression[15]. This is attributed to the adoption of different approaches by eye care professionals in China who are aware of the significance of low-concentration atropine. However, in Kenya, the actual prevalence of myopia remains unknown among children [6]. Hence, eye care professionals concentrate on dispensing spectacles with minimal focus on monitoring myopia progression among children [2]. Therefore, eye care professionals should be educated on myopia control measures to address myopia among children.

CONCLUSION

This study demonstrates a low level of knowledge, attitude, and practice on low-concentration atropine prescription for control of myopia progression among children by eye care professionals in Kenya. As a result, the Ministry of Health, in partnership with other stakeholders in eye health, should develop a pediatric refraction guideline for utilization by eye care professionals in Kenya. The pediatric refraction guideline to be developed should be utilized by eye care professionals with the aim of scaling myopia control among children. Another aspect that should be integrated within the pediatric refraction guideline is the aspect of continuous medical education to enlighten eye care professionals on the significance of myopia control among children and the methods to be adopted for the control. Finally, eye care professionals should be at the forefront in encouraging parents to ensure that their children undergo regular eye examinations to assess for myopia progression and educate them on the need to utilize low-concentration atropine and outdoor activities for their children.

Conflict of interests

The authors declare no conflict of interest.

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Ethical approval and consent for participation

Ethical approval was issued by the Maseno University Ethics Review Committee.

All methods were carried out in accordance with the Helsinki Declaration.

Consent was sought from each eye care provider who participated in this study.

Consent for publication

Not applicable.

Availability of data and materials

The data is available upon reasonable request from the author

Authors' contributions

S.M. developed the concept, wrote the manuscript and did the analysis; RH — review, visualization and editing of the manuscript.

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