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RESEARCH ARTICLE

Ocular Morbidities Prevalence and Patterns among Children in Rivers State from 2019-2023: A Retrospective Study

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Abstract: Childhood ocular morbidity encompasses a spectrum of eye diseases that negatively impact mental development, educational attainment, and quality of life. This study aimed to assess the prevalence and pattern of paediatric ocular morbidities in Rivers State between 2019 and 2023. A retrospective design was employed, including all cases of ocular morbidity recorded at Rumuokwurusi Model Primary Health Centre and Obio Cottage Hospital in Obio Akpor Local Government Area (LGA), Rivers State, from 2019 to 2023. Data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 23. The findings revealed a prevalence of paediatric ocular morbidity of 94.9% ($n = 167$). The most common conditions included eye irritation (75%), conjunctivitis (43%), red eye (41%), near vision impairment (40%), refractive errors (37%), and far vision impairment (32%). Significant associations were observed between age and specific ocular morbidities, including conjunctivitis ($p < 0.001$), far vision impairment ($p = 0.030$), near vision impairment ($p = 0.030$), and refractive errors ($p = 0.010$). A significant association was also identified between sex and dry eye syndrome ($p = 0.025$). These results indicate that paediatric ocular morbidity constitutes a major public health concern in Rivers State and demands appropriate interventions to address the ocular health needs of the population. Improved eye health service delivery is recommended, including the integration of eye care services into school health programs and the primary healthcare system in Rivers State to ensure accessible and adequate ocular healthcare for children.

Keywords: ocular morbidities, refractive errors, Rivers State, Nigeria

Abbreviations

LGA	Local Government Area
PEC	Primary Eye Care
PHC	Primary Health Centre
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization
UEHC	Universal Eye Health Coverage
RSHMB	Rivers State Hospital Management Board
RSHREC	Rivers State Health Research Ethics Committee

1 Introduction

Ocular morbidity can be described generally as any eye disease and this includes visually impairing and non-visually impairing conditions which have the capacity to negatively affect the cognitive, neurological, and emotional development of children as well as the overall quality of life of affected persons [1, 2]. In the year 2020, about 300 million people worldwide were reported to be affected by moderate and severe visual impairments, and up to 43.3 million were blind [3]. In addition, most of these visually impaired persons live in low- and middle-income countries (LMIC), with the greatest shortages of eye healthcare services reported to be in sub-Saharan Africa [3]. Childhood blindness has been described as a public health burden which can be effectively alleviated with prompt recognition of these diseases and provision of

timely interventions [4]. Ocular diseases can generally be congenital or acquired [4, 5], and the occurrence of these diseases could be related with systemic disorders including endocrine and/or metabolic disorders, inflammatory and immune response mechanism, infections, among other diseases [5].

Various forms of ocular morbidities have been reported to include uncorrected refractive errors, cataracts, glaucoma [3, 6], allergic conjunctivitis, pingueculae [6], conjunctival diseases, allergic/vernal/infective conjunctivitis, lid disorders, squint, corneal scarring [4], color vision defects, suspected glaucomatous disc among others [7]. These ocular morbidities can result in blindness and visual impairment which can negatively affect the development, educational attainment, socio-economic status and general quality of life of affected children [1, 2, 8, 9]. These notwithstanding, many ocular diseases are known to still begin in childhood and progress unnoticed to cause severe ocular disability in the later life [9]. It has been reported that up to about 1.5 million of 39 million blind persons worldwide were children. According to estimates, childhood blindness accounts for over 70 million blind person years globally and is found to be the second leading cause of blindness after adult cataracts [8]. In studies conducted in India, prevalence of ocular diseases of 27.65% has been reported among children [9]. In Nigeria, various prevalence data have also been reported. In South Western Nigeria, about 16% of school children were found to have ocular diseases which included conjunctival diseases (8%) especially allergic/vernal conjunctivitis (7.3%), refractive error (5.9%), among others [10]. Others included prevalence of 29.3% in North Western Nigeria [11], 9.2% in a study in Enugu [7], 14.3% in Calabar [8], and 23.5% in Abakaliki [2].

A Global Action Plan has been earlier put in place by the World Health Organization (WHO), to ensure Universal Eye Health Coverage (UEHC) [12, 13]. The UEHC guarantees that everyone has access to necessary preventive, curative, rehabilitative, and promotional visual health services that are of high enough quality to be successful while also preventing financial hardship when paying for these services [13]. Early detection of ocular morbidities through suitable eye screening programs as well as the provision of timely ocular health interventions can be useful in mitigating the burden of ocular diseases and strengthen the attainment of UEHC [2, 8, 9, 11]. Limited access to eye care services, insufficient numbers of trained ophthalmologists, and socio-economic barriers have been reported to be capable of adversely affecting the provision of eye care services particularly in rural and underserved areas [14–16]. Addressing these challenges requires comprehensive strategies encompassing healthcare infrastructure improvement, provision of community outreaches and screening programmes, education, and affordable treatment options to reduce the burden of ocular morbidities [1, 5, 10].

In Rivers State, Nigeria, ocular morbidities are still a source of public health concern [17–20], with much work left to be done if the tenets of UEHC are to be achieved in the State. As part of the efforts to mitigate the problem of ocular morbidities, there was the need to identify the prevalence and pattern of these diseases in the State, which warranted the conduct of this study. In addition to these, there is lack of research showing the prevalence of ocular morbidities among children in PHC facilities in Rivers State and there is need for these kinds of studies, considering that this is the first level of healthcare. Examination of the eye health of vulnerable members of society is therefore very important and pivotal in early detection, prompt treatment and timely referral for specialized care at the primary level. Furthermore, evidence on the prevalence and patterns of paediatric ocular morbidities in the primary health care setting is needed for planning and assessing preventive and therapeutic measures, hence this study. This study thus aimed at assessing the prevalence and patterns of occurrence of ocular morbidities presenting among children from 2019 to 2023 in Rivers State, Nigeria.

2 Methods

This was a facility-based, retrospective study that was conducted at the Rumuokwurusi Model Primary Health Centre and the Obio Cottage Hospital both in Obio Akpor LGAs in Rivers State. Retrospective data of all cases of paediatric ocular morbidities recorded between the years 2019 and 2023 were extracted using a data abstraction tool.

2.1 Ethics

Ethical approval for this research was obtained from the Rivers State Hospital Management Board (approval number: RSHMB/RSHREC/2024/014), which granted access to the medical records of the selected healthcare facilities. Permission was then obtained from all concerned PHC authorities including the Medical-Officers-of-Health and facility heads of the two assessed PHC facilities. Data extraction was conducted with the assistance of two research assistants,

who were trained for four hours on the required data points to extract and the methodology for reviewing medical records to identify ocular morbidities managed at the two facilities over the five-year study period. Once this was done, the required data was extracted from the medical records of the children. Data analysis was performed using the SPSS version 23. Data was expressed as frequency and percentages, and presented on charts and tables. The chi-squared and logistic regression tests were used to determine the presence of any relationship existing between sociodemographic characteristics (age and sex) of the children and the occurrence of ocular morbidities. Data were collected electronically and safely stored in a secure server of the Kobo toolbox Open-Source Mobile Data Collection platform.

3 Results

3.1 Sociodemographic characteristics of cases

Out of 176 cases, 57.4% were males and 42.6% were females. Thirty percent (30%) and 30.7% of cases were within the age range of 0–4 and 13–16, respectively, 20.5% were within the age range of 5–9 and 18.7% were aged 10–12 years. About half of the cases (50.6%) had both mother and father not having any form of education; 64.2% and 78.4% had fathers and mothers respectively who were self-employed as shown in Table 1.

Table 1 Sociodemographic characteristics of paediatric cases (n = 176)

Variables	Category	Frequency n (%)
Age (years)	< 5	50 (28.4)
	5–9	36 (20.5)
	10–12	46 (26.1)
	13–16	44 (25.0)
Sex	Male	101 (57.4)
	Female	75 (42.6)
Father's Education	None	89 (50.6)
	Primary	1 (0.6)
	Secondary	4 (2.3)
	Tertiary	72 (40.9)
	Vocational/Technical	10 (5.7)
Mother's Education	None	89 (50.6)
	Primary	3 (1.7)
	Secondary	10 (5.7)
	Tertiary	67 (38.1)
	Vocational/Technical	7 (4.0)
Father's Employment	Unemployed	1 (0.6)
	Self-Employed	113 (64.2)
	Employed by others	62 (35.2)
Mother's Employment	Unemployed	5 (2.8)
	Self-Employed	138 (78.4)
	Employed by others	33 (18.8)

3.2 Paediatric ocular morbidities

In the study, out of 176 cases, 167 (94.9%) had one or more forms of ocular morbidity. These are shown in Figure 1.

3.3 Pattern of paediatric ocular morbidities

Among the paediatric cases of ocular morbidities assessed, the most common ocular morbidities were eye irritation (75%), conjunctivitis (43%), red eye (41%), near vision (40%), refractive errors (37%) and far vision (32%). Other ocular morbidities included squint/strabismus (19%), eye trauma (16%), astigmatism (10%), dry eyes (8%), pterygium (7%), amblyopia (4%), loss of vision (4%), esotropia (3%), blepharitis (3%), among others (See Figure 2).

3.4 Association between age and paediatric ocular morbidities

The chi-square test revealed a significant association between age and ocular morbidity among children in Rivers State ($p < 0.005$) for several conditions (conjunctivitis, far vision,

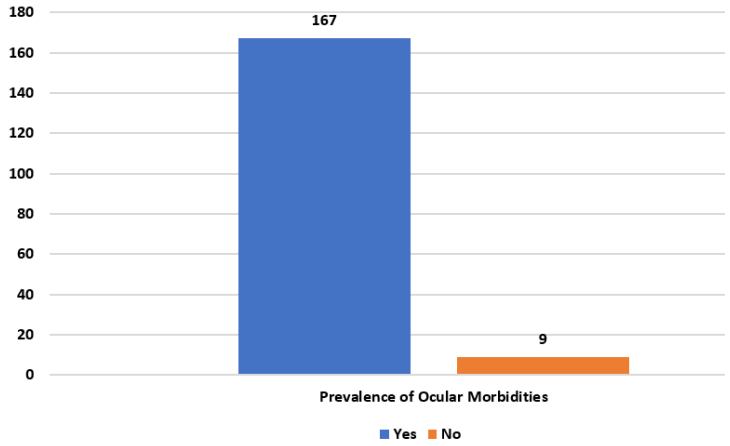

Figure 1 Prevalence of ocular morbidity among children in Rivers State

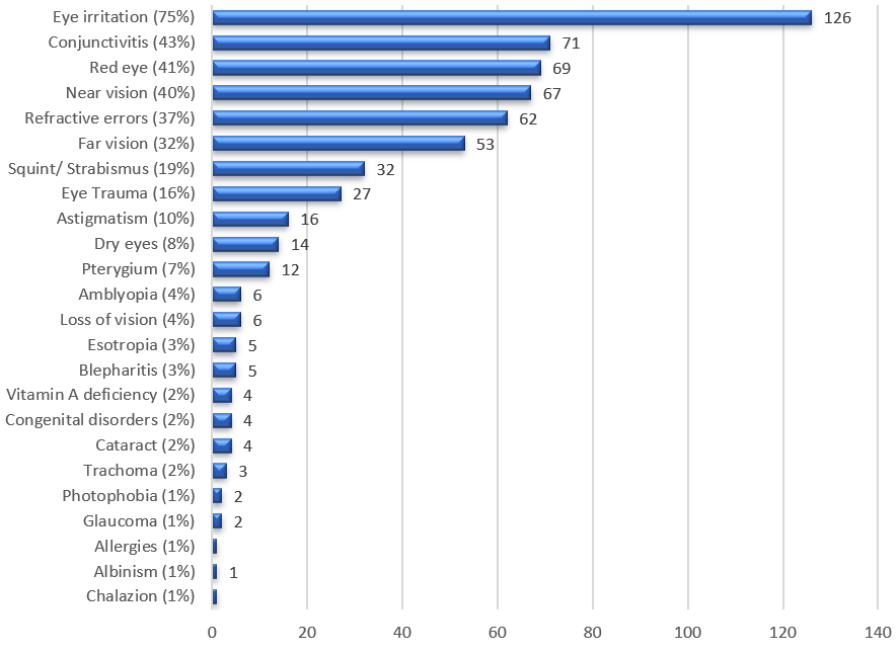

Figure 2 Pattern of Ocular Morbidity Among Children in Rivers State

near vision, refractive errors, and squint/strabismus). A binary logistic regression test was done to quantify the strength and direction of this association. The binary logistic regression showed that age significantly influenced the prevalence of various ocular morbidities among children in this study. Notable associations observed included the association between age and conjunctivitis (children aged 10-12 years showed significantly increased odds of conjunctivitis compared to other age groups, while those aged 13-16 years had significantly less odds), far vision problems (children aged 10-12 and 13-16 years exhibited significantly more odds of far vision problems compared to younger children), near vision problems (children aged 13-16 years had significantly increased odds of near vision compared to younger age groups), and refractive errors (children aged 10-12 and 13-16 years demonstrated significantly increased odds of refractive errors compared to children under 5 years). However, age was not significantly associated with squint/strabismus across all age groups (Table 2).

3.5 Association between sex and paediatric ocular morbidities

The chi-square test examined the associations between sex and ocular morbidities among children residing in Rivers State. Only one condition (dry eye syndrome) was significantly associated with sex on chi-square analysis ($p = 0.025$); binary logistic regression further confirmed this association, showing that females had a lower odds of dry eye syndrome compared with males (OR = 0.37, 95% CI: 0.08–1.69, $p = 0.041$) (Table 3).

Table 2 Association between age and paediatric ocular morbidities

Type of Ocular Morbidity	Age (years)				χ^2	p	OR (95% CI)	p value
	<5 (n = 50)	5-9 (n = 36)	10-12 (n = 46)	13-16 (n = 44)				
Albinism	0 (0)	0 (0)	0 (0)	1 (2.3)	3.017	0.389	-	-
Allergies	0 (0)	0 (0)	1 (2.2)	0 (0)	2.842	0.417	-	-
Amblyopia	2 (4.0)	1 (2.8)	1 (2.2)	2 (4.5)	0.482	0.923	-	-
Astigmatism	1 (2.0)	3 (8.3)	4 (8.7)	8 (18.2)	7.476	0.058	-	-
Blepharitis	3 (6.0)	1 (2.8)	0 (0)	1 (2.3)	3.205	0.361	-	-
Cataract	1 (2.0)	0 (0)	1 (2.2)	2 (4.5)	1.879	0.598	-	-
Chalazion	1 (2.0)	0 (0)	0 (0)	0 (0)	2.534	0.469	-	-
Congenital disorders	2 (4.0)	0 (0)	0 (0)	2 (4.5)	3.602	0.308	-	-
Conjunctivitis	34 (68.0)	18 (50.0)	10 (21.7)	9 (20.5)	31.133	<0.001	-2.112(0.05, 0.31)	<0.001*
Dry eyes	5 (10.0)	3 (8.3)	2 (4.3)	4 (9.1)	1.188	0.756	-	-
Esotropia	2 (4.0)	1 (2.8)	0 (0)	2 (4.5)	2.052	0.562	-	-
Eye irritation	38 (76.0)	24 (66.7)	35 (76.1)	29 (65.9)	2.063	0.559	-	-
Eye Trauma	7 (14.0)	4 (11.1)	9 (19.6)	7 (15.9)	1.208	0.751	-	-
Far vision	10 (20.0)	6 (16.7)	19 (41.3)	18 (40.9)	10.697	0.013	1.019 (1.11, 6.93)	0.030*
Glaucoma	1 (2.0)	0 (0)	1 (2.2)	0 (0)	1.692	0.639	-	-
Loss of vision	2 (4.0)	0 (0)	1 (2.2)	3 (6.8)	3.090	0.378	-	-
Near vision	13 (26.0)	11 (30.6)	18 (39.1)	25 (56.8)	10.534	0.015	1.320 (1.57, 8.93)	0.003*
Photophobia	0 (0)	0 (0)	1 (2.2)	1 (2.3)	1.935	0.586	-	-
Pterygium	2 (4.0)	2 (5.6)	4 (8.7)	4 (9.1)	1.328	0.722	-	-
Red eye	25 (50.0)	13 (36.1)	14 (30.4)	17 (38.6)	4.080	0.253	-	-
Refractive errors	10 (20.0)	6 (16.7)	26 (56.5)	20 (45.5)	21.675	<0.001	1.204 (1.34, 8.30)	0.010*
Squint/ Strabismus	8 (16.0)	2 (5.6)	9 (19.6)	13 (29.5)	7.897	0.048	0.789 (0.81, 5.96)	0.120
Trachoma	2 (4.0)	0 (0)	1 (2.2)	0 (0)	3.020	0.389	-	-
Vitamin A deficiency	3 (6.0)	1 (2.8)	0 (0)	0 (0)	5.262	0.154	-	-

Note: * $P < 0.05$

Table 3 Association of sex and paediatric ocular morbidity cases

Type of Ocular Morbidity	Sex		χ^2	p	OR (95% CI)	p value
	Male, n (%) ($n = 101$)	Female, n (%) ($n = 75$)				
Albinism	0 (0)	1 (1.3)	1.354	0.245	-	0.997
Allergies	0 (0)	1 (1.3)	1.354	0.245	-	0.997
Amblyopia	4 (4.0)	2 (2.7)	0.219	0.640	0.73 (0.12, 4.37)	0.642
Astigmatism	6 (5.9)	10 (13.3)	2.846	0.092	2.42 (0.84, 7.03)	0.100
Blepharitis	2 (2.0)	3 (4.0)	0.636	0.425	2.06 (0.34, 12.66)	0.434
Cataract	3 (3.0)	1 (1.3)	0.519	0.471	0.43 (0.05, 3.73)	0.483
Chalazion	1 (1.0)	0 (0)	0.747	0.387	-	0.997
Congenital disorders	4 (4.0)	0 (0)	3.039	0.081	-	0.997
Conjunctivitis	44 (43.6)	27 (36.0)	1.023	0.353	1.37 (0.69, 2.72)	0.312
Dry eyes	12 (11.9)	2 (2.7)	4.991	0.025	0.37 (0.08, 1.69)	0.041*
Esotropia	3 (3.0)	2 (2.7)	0.014	0.905	1.11 (0.18, 6.83)	0.905
Eye irritation	74 (73.3)	52 (69.3)	0.328	0.567	1.21 (0.59, 2.48)	0.567
Eye Trauma	12 (11.9)	15 (20.0)	2.184	0.139	1.85 (0.81, 4.24)	0.143
Far vision	27 (26.7)	26 (34.7)	1.287	0.257	1.45 (0.76, 2.78)	0.258
Glaucoma	1 (1.0)	1 (1.3)	0.045	0.832	1.35 (0.08, 21.96)	0.832
Loss of vision	2 (2.0)	4 (5.3)	1.470	0.225	2.78 (0.50, 15.64)	0.244
Near vision	41 (40.6)	26 (34.7)	0.641	0.423	1.29 (0.67, 2.47)	0.424
Photophobia	1 (1.0)	1 (1.3)	0.045	0.832	1.35 (0.08, 21.96)	0.832
Pterygium	8 (7.9)	4 (5.3)	0.454	0.501	0.65 (0.19, 2.26)	0.503
Red eye	40 (39.6)	29 (38.7)	0.016	0.900	1.04 (0.52, 2.07)	0.900
Refractive errors	35 (34.7)	27 (36.0)	0.034	0.853	1.06 (0.57, 1.98)	0.853
Squint/ Strabismus	23 (22.8)	9 (12.0)	3.357	0.067	0.46 (0.20, 1.07)	0.071
Trachoma	3 (3.0)	0 (0)	2.266	0.132	-	0.997
Vitamin A deficiency	4 (4.0)	0 (0)	3.039	0.081	-	0.997

Note: * $P < 0.05$

4 Discussion

This study revealed that the extent of occurrence of eye irritations, conjunctivitis, red eye, near vision, refractive errors and far vision was high, with eye irritations and conjunctivitis

being the most prevalent ocular morbidities. Age was also found to be associated with the occurrence of conjunctivitis, far vision impairment, near vision impairment, refractive errors, and squint/strabismus. Male children were also found to be more likely to be affected by dry eyes than females.

The finding of having eye irritations and conjunctivitis as predominant ocular morbidities is in agreement with the findings of other studies that reported similar ocular morbidities as being predominant [4, 8, 11]. Another study also reported that allergic conjunctivitis and cataracts were ocular morbidities that more commonly occurred in riverine areas than upland areas [21]. This is especially relevant to the present study considering that the present study area is situated in a riverine location where illegal crude oil refining activities have also been reported and implicated in the occurrence of eye irritations and allergic conjunctival inflammation [21]. The present study findings were however found not to be in agreement with the findings of other authors [1,9], and could be due to ethnic, genetic, socioeconomic, and environmental differences in comparison to the present study area.

It is important to note that when ocular morbidities are prevalent among children, especially eye irritations and conjunctivitis, they can have far-reaching implications in the lives of the affected children as well as for public health. These morbidities are common and can make a child have the frequent need to visit out-patients' clinics as a result of the discomfort from excessive itching, pain, and tearing, which may negatively affect school attendance and in certain cases, their academic performance [2, 8]. It is also crucial to note that the prevalent ocular diseases identified in this study are largely preventable or treatable, which points to the need for ocular health education and screening through school health programs and other health promotion avenues [9, 10, 22]. Left untreated, these seemingly minor ailments can escalate into more severe infections or complications, potentially leading to chronic issues or vision impairment [9, 11]. The high prevalence of common ocular conditions in this study underscores the need for enhanced public awareness, improved hygiene practices, and accessible primary eye care services to manage and mitigate their impact in a timely and effective manner [8, 9].

The present study also found that certain ocular morbidities (notably refractive errors) were significantly associated with children's age and sex. This finding is also in agreement with the findings published in another study that make similar reports [23]. It is noteworthy that undiagnosed or untreated vision problems in young children can impair their ability to learn, as vision is critical for reading, writing, and other educational activities. Also, undetected refractive errors can cause eye strain, headaches, and fatigue, further hindering a child's daily activities [8, 11, 22]. The detection of these ocular health problems is best done at an early age, however it has been reported that in low resource settings, children do not routinely have the opportunity to be part of eye examination exercises, where screening for ocular morbidities can be done [8]. It is essential that inadequacies in providing ocular healthcare contact for children at a tender age are mitigated as soon as they are noticed in order to safeguard the ocular health, wellbeing and quality of life of children. The results of the present study also show that ocular health issues are a source of public health concern in Rivers State and require a commensurate means of tackling them.

While this study presents a valuable facility-based retrospective analysis of paediatric ocular morbidities in Rivers State (2019–2023), addressing a critical research gap in understudied riverine regions of sub-Saharan Africa with unique environmental stressors (*e.g.*, crude oil-related pollution), it was however limited by a narrow geographic focus (single LGA) that hinders generalizability, underutilization of multivariate regression to control for confounding sociodemographic variables (*e.g.*, parental education), and a descriptive design that stops short of causal analysis of environmental and ocular morbidity links.

5 Conclusion

This study confirms that ocular health problems are highly prevalent among children in Rivers State and are associated with age and sex. In light of these findings, the following recommendations have been made:

(1) Educational stakeholders in Rivers State should ensure the optimal implementation of school health programmes in both public and private schools considering their usefulness in promoting early detection, prompt treatment of ocular morbidities and reduction of the burden of ocular ill-health among children.

(2) Government and non-governmental organizations should implement targeted health interventions to improve ocular health outcomes in Rivers State by enhancing eye health service

delivery and ensuring universal access to ocular healthcare. One of such is ensuring that ocular health services reach the populace by scaling up Primary Eye Care (PEC) services in the PHC system in Rivers State.

(3) Considering the prevalence of ocular morbidities in this study, it is crucial that health education and promotion actions by public health enthusiasts targeted at improving the prevention of these morbidities, are put into motion to further reduce the incidence of ocular morbidities in the populace.

(4) Future studies including multi-LGA studies to expand generalizability, multivariate analyses of sociodemographic/environmental risk factors, and longitudinal follow-up to assess the progression of mild ocular morbidities are also recommended.

Author contributions

In addition to contributing to data collection, study design, and the interpretation of results, Pearl Iyaye Daibi Abereton produced the first draft of the manuscript. Siyeofori Belema Dede helped with the results' interpretation. Adaeze Chidinma Oreh oversaw the study, helping with data gathering, study design, and result interpretation. The work was read and commented upon by all authors. All authors approved the final version of the manuscript for publication.

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Conflicts of interest

The authors declare no conflict of interest.

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