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Epidemiology of oculo-orbital tumours in Malawian children: a 10-year review of cases from tertiary hospitals

Grace Obumneke Ogbonna[1*], Miriam Chikhoza[1], Michael Agyemang Kwarteng[2], Ngozika Esther Ezinne[2,3], Rosemary Ehigbor[4], Princewill Obinna Anyatonwu[5] and Osamudiamen McHillary Ogiemudia[6,7]

Abstract

Background Ocular tumours, regardless of type, impose significant economic and psychosocial burdens on sufferers and their families [1]. Paediatric cases can lead to substantial challenges, including developmental delays, economic strain, and psychological distress. The aim of this study was to determine the prevalence and presentation of ocular tumours among children in Malawi.

Method The study was designed as a hospital-based cross-sectional retrospective review of paediatric files obtained from the Ophthalmology Department of the four tertiary hospitals (Kamuzu, Queen Elizabeth, Mzuzu and Zomba Central Hospitals) in Malawi from 2009 to 2019. Data was analysed using the Statistical Package for the Social Sciences version 26.0 for data analysis. A p-value of < 0.05 was considered statistically significant.

Results A total of 1,014 out of 40,423 children were diagnosed with ocular tumours representing an overall prevalence of 2.51% (CI: 2.36–2.67). Among them, 485 were females (47.8%) and 529 males (52.2%), which was not statistically significant ($p = 0.426$). Most (46.1%) of the cases were from the Queen Elizabeth Central hospital with most cases recorded in 2019. Patients aged 3–5 years had the most cases of ocular tumours. Retinoblastoma was the most prevalent malignant tumour (41.6%), while dermoid cysts was the most common (20.7%) benign tumour. Tumours were more frequently found in the left eye (51.1%) compared to the right eye (43.8%), with 5.1% involving both eyes. The proportion difference in laterality between the right and left eye was statistically significant ($p = 0.012$). Imaging was performed in 10.0% of cases, with MRI being the most common (6.5%), followed by B-scan (2.4%), CT-scan (0.9%), among others. Surgical procedures were performed in 80.4% of cases, with excision being the most common (47.3%), followed by enucleation (27.2%), and exenteration (4.2%).

Conclusion The study observed a high prevalence of ocular malignancies with children aged 3 to 5 years being the most affected age group. Surgical excision was the main stay of treatment for children affected by ocular tumours in Malawi. Poor diagnostic and therapeutic options remain a big limitations to the provision of care for this population as such there is an urgent need to improve paediatric oncology services in Malawi. Policymakers and healthcare

*Correspondence:
Grace Obumneke Ogbonna
ogbonnagrace19@gmail.com

Full list of author information is available at the end of the article

providers must prioritize investments in diagnostic infrastructure, training, and integrated care pathways to enhance the management of paediatric ocular tumours and improve survival rates.

Keywords Pediatric, Tumous, Malawi, Policy makers, Exenteration

Introduction

Ocular tumours encompass both malignant and non-malignant growth within the eye, its adnexa, or from adjacent structures such as the sinuses and nasal cavity, as well as secondary metastasis (Yeager et al. 2024). These tumours can be sight threatening and even life, with profound individual and societal impacts. Although ocular cancers are relatively rare, its incidence worldwide has risen due to factors like population aging, increased physical inactivity, and genetic mutations [1, 2] These trends emphasize the importance of early detection for effective management.

The prevalence of ocular tumours varies across regions and populations, influenced by factors such as race, geography, age, and tumour type [3]. For example, basal cell carcinoma is the most common malignant tumour affecting the eyelids among Caucasians in Europe and America, whereas sebaceous gland tumours predominate among Asian populations [4]. Uveal melanoma commonly affects the elderly, while retinoblastoma is the most prevalent primary and malignant paediatric ocular tumour globally [5, 6].

In Africa the prevalence of ocular-orbital tumours among the paediatric population is notably variable. A study in Ethiopia reported malignant tumours in 96.1% of ocular-orbital paediatric cases, with retinoblastoma comprising 77.2% of these [7]. In contrast, a study in northern Malawi found retinoblastoma in only 7.1% of ocular cancers among tertiary clinic patients, highlighting possible geographical variations in tumour distribution [8].

Paediatric ocular tumours can be unilateral or bilateral, malignant or benign, and can be congenital or acquired. Factors linked to ocular tumours in children include genetic mutations [9], hereditary influences [10], obesity, and environmental exposures like sunlight, among others [11–13]. Hereditary factors are implicated in intraocular tumours such as retinoblastoma, which is could be malignant, bilateral, and inherited in about 40% of cases [5]. In contrast, benign tumours like dermoid cysts are rarely hereditary and could be unilateral or bilateral [14, 15].

Ocular tumours, regardless of type, impose significant economic and psychosocial burdens on sufferers and their families [1]. Paediatric cases can lead to substantial challenges, including developmental delays, economic strain, and psychological distress.

Delayed clinical presentation can result in poor prognoses and blindness, impacting a child's quality of life and self-esteem [8, 16]. Effective clinical management often requires imaging and histopathological assessment to determine malignancy and invasion [17]. However, in low-income countries, barriers like limited imaging access, technical expertise, and high costs often impede timely intervention. In Malawi, for example, tertiary Central Hospitals are the primary centres for histology and biopsy testing in paediatric cases.

Although studies on ocular tumours exist globally, including in the African paediatric population [7, 8, 10, 17, 18], the epidemiology of these tumors among Malawian children remains unreported. The purpose of this study was to assess the epidemiology of ocular tumours among children across the tertiary hospitals in Malawi. Additionally, the study examined the trends in the presentation of ocular tumours across a decade.

Methodology

Study design

This study was designed as a hospital-based cross-sectional retrospective review of paediatric files obtained from the Ophthalmology Department of the four tertiary hospitals (Kamuzu, Queen Elizabeth, Mzuzu and Zomba Central Hospitals) in Malawi.

Study setting

This study was conducted in the four Central hospitals in Malawi namely Kamuzu, Queen Elizabeth, Mzuzu and Zomba Central. Malawi is one of the countries in the Sub-Saharan region of Africa. The tertiary hospitals are the apex hospitals in Malawi and they serve as referral hospitals to the primary and district hospitals in the country. Malawi is divided into three geographical zones namely Northern, Southern and Central regions. The population of the Northern, Central and Southern geographical zones are 2,289,780, 7,523,340 and 7,750,755 respectively [19]. The Northern and Central region of Malawi has one Central Hospital each; Mzuzu Central Hospital, located in Mzuzu City and Kamuzu Central Hospital- located in Lilongwe City. While the Southern region has two Central Hospitals; Queen Elizabeth and Zomba Central Hospitals located in Blantyre and Zomba respectively.

At the tertiary healthcare facilities, patients who presents to the ophthalmology departments are seen by Ophthalmic Clinical Officers, Optometrists and Ophthalmologists. Children are either referred to the clinic from the district or primary health care facilities, as well as private eye clinics within the country. Additionally, the children are expected to under a comprehensive eye examination which included case history, visual acuity,

ocular health assessment, dilated funduscopy, intraocular pressure, refraction and any other assessment that may be necessary as identified by the ocular assessment, hence the selection of this study centres.

Study population

The target population for this research consisted of case files belonging to children who visited the eye departments in the various tertiary hospitals from 2010 to 2019.

Sample size and sampling method

All the patient files belonging to children aged 12 years and below were included in this study regardless of whether they were referred from a secondary or primary health care level or not. The files were selected using the census sampling technique.

Inclusion and exclusion criteria

Every paediatric patient's files seen from January 2010 to December 2019 was included in the study. The study included every files of children seen within the period under review. The study excluded files with missing variables including age, gender, and diagnosis. We recorded the patient's age, sex, month and year of presentation, type of tumour, eye(s) affected, visual acuity (VA) reported as a Snellen's acuity, or as following objects for children too young for normal VA assessment) location of tumour, time of onset, temporal occurrence, malignancy, investigations done and management.

Data collection method

Following the ethical clearance from the National Health Science Research Committee (NCHRS) and approval from the participating healthcare facilities, the team of trained research assistants comprising of 5 qualified optometrists were directed to the archive rooms (data storage rooms) for the ophthalmology departments at the different healthcare facilities. Firstly, the clinicians separated the folders for all the patients who at the time of their presentation to the healthcare facilities were twelve years or below. This was followed by a careful review of the folders to ensure the completeness of the demographic details such as age and gender as well as diagnosis reached. After which, those that were found to have complete data were further separated from the rest of the folders and the total number of files encountered was recorded based on their age groups and gender. Thereafter, those diagnosed with any form of ocular tumour was further separated and details of the diagnosis such as year of presentation, type of tumour, eye(s) affected, visual acuity, location of tumour time of onset, temporal occurrence, malignant at the time of assessment, investigations done and management were entered into the data entry sheet. The location of the tumor were classified as eyelid if it occurred on the eyelid, ocular surface if present on the cornea, conjunctiva and the sclera, orbital, periorbital, or Intraocular (affecting the iris, ciliary body, the choroid, the vitreous and the retina).

Data analysis

The statistical software used for data analysis was SPSS (Statistical Package for the Social Sciences) version 26.0. A p-value of <0.05 was considered statistically significant. Descriptive statistics were used to summarize the demographic and clinical characteristics of the patients. Frequencies and percentages were calculated for categorical variables such as the type of tumour, the prevalence of ocular tumours and management. Visual impairment was classified as follows: Normal = VA ≥ 6/6; Mild = VA < 6/9 – 6/18 (LogMar < 0.2–0.5), Moderate = < 6/18 – 6/60 (LogMar 0.5-1) and Severe 3/60 to light Perception (LogMar 1 -1.3); Blindness was regarded as no light perception [20, 21].

Ethical consideration

The approval for this study was gotten from the National Health Science Research Committee (NCHRS) with ethical clearance number 2543. In addition, permission to access the patients' records was sought and gotten from the study centres, through their research ethics committees. The study followed the outlined protocols for data collection as specified by the research policies of the various hospitals involved in the study. Furthermore, the study thereafter adhered to the Helsinki principles by ensuring that patients' anonymity was maintained via the codification of patients' details and no harm came to the patients during and after the course of the study.

Results

There are 1,014 patients diagnosed with ocular tumours; 485 females (47.8%) and 529 males (52.2%). Most (46.1%) of the cases were from the Queen Elizabeth Central hospital with most cases recorded in 2019. Patients aged 3–5 years accounted for the highest proportion of ocular tumor cases (32.5%) during the study period, followed closely by those aged 6–12 years (30.2%) (Table 1). Notably, nearly one-quarter (24.8%) of patients were between 1 and 2 years old, and overall, approximately two-thirds (62.7%) of cases occurred in children aged 3–12 years. However, there were no statistically significant differences in patient distribution by sex across hospitals ($p = 0.137$), years ($p = 0.426$), or age groups ($p = 0.249$) (Table 1).

Prevalence and trends of ocular tumours

Over the decade, the total number of tumour cases is 1,014 out of 40,423 paediatric cases, resulting in an overall prevalence of 2.51% (CI: 2.36–2.67). The annual

Table 1 Sociodemographic distribution of participants

Variables	Sub-group	Sex		Total (%)	*P*-value
		Male	Female		
Hospital	Kamuzu Central	198 (19.5)	153 (15.1)	351 (34.6)	0.137
	Zomba Central	27 (2.7)	19 (1.9)	46 (4.5)	
	Queen Elizabeth Central	232 (22.9)	235 (23.2)	467 (46.1)	
	Mzuzu Central	72 (7.1)	78 (7.7)	150 (14.8)	
Year	2010	40 (3.9)	43 (4.2)	83 (8.2)	0.426
	2011	50 (4.9)	42 (4.1)	92 (9.1)	
	2012	47 (4.6)	45 (4.4)	92 (9.1)	
	2013	54 (5.3)	52 (5.1)	106 (10.5)	
	2014	47 (4.6)	56 (5.5)	103 (10.2)	
	2015	43 (4.2)	41 (4.0)	84 (8.3)	
	2016	55 (5.4)	50 (4.9)	105 (10.4)	
	2017	54 (5.3)	48 (4.7)	102 (10.1)	
	2018	55 (5.4)	58 (5.7)	113 (11.1)	
	2019	84 (8.3)	50 (4.9)	134 (13.2)	
Age group	0–3 months	12 (1.2)	9 (0.9)	21 (2.1)	0.249
	4–11 months	59 (5.8)	36 (3.6)	95 (9.4)	
	1–2 years	139 (13.7)	123 (12.1)	262 (25.8)	
	3–5 years	162 (16.0)	168 (16.6)	330 (32.5)	
	6–12 years	157 (15.5)	149 (14.7)	306 (30.2)	
Total		529 (52.2)	485 (47.8)	1014 (100.0)	

Table 2 Prevalence and trends of ocular tumours

Year	Number of tumour cases	Number of paediatric cases	Prevalence (%), CI
2010	83	2568	3.23 (2.58–3.99)
2011	92	3322	2.77 (2.24–3.39)
2012	92	3794	2.42 (1.96–2.97)
2013	106	3979	2.66 (2.19–3.21)
2014	103	3943	2.61 (2.14–3.16)
2015	84	4165	2.02 (1.61–2.49)
2016	105	4428	2.37 (1.94–2.86)
2017	102	4479	2.28 (1.86–2.76)
2018	113	4761	2.37 (1.96–2.85)
2019	134	4984	2.69 (2.26–3.18)
Total	1014	40,423	2.51 (2.36–2.67)

prevalence fluctuates, with the highest prevalence in 2010 at 3.23% (CI: 2.58–3.99) and the lowest in 2015 at 2.02% (CI: 1.61–2.49) Table 2. The data demonstrates a general trend of decreasing prevalence over the years, despite the increasing number of paediatric cases, Fig. 1.

Presentation of ocular tumours among participants

Tumours were more frequently found in the left eye (51.1%) compared to the right eye (43.8%), with 5.1% involving both eyes. The proportion difference in laterality between the right and left eye was statistically significant ($p = 0.012$). Presenting visual acuity was normal in 17.8% of cases, while 27.2% were blind, and nearly half (49.8%) had undocumented visual acuity. Tumours were predominantly located intraocularly (46.5%), followed by the ocular surface (cornea, conjunctiva and sclera) (27.5%) and eyelid (24.5%). Most tumours were congenital (67.8%), with most cases as new occurrences (95.9%) and benign (54.5%), Table 3. Visual impairment was classified based on distance visual acuity as follows: normal vision (6/6–6/12), moderate impairment (worse than 6/18–6/60), severe impairment (worse than 6/60–3/60), and blindness (< 3/60 to no light perception).

Distribution of types of ocular tumours among the participants

Retinoblastoma was the most prevalent malignant tumour (41.6%), followed by squamous cell carcinoma (1.8%) and rhabdomyosarcoma (1.1%), among others. Among benign tumours, dermoid cysts are the most common (20.7%), with other types including papilloma (6.1%), unspecified ocular growth (8.7%), among others, Table 4. Compared to all the other tumors, retinoblastoma was the most commonly encountered tumor observed in the study Table 4.

Methods of ocular tumour assessment

Imaging was performed in 10.0% of cases, with MRI being the most common (6.5%), followed by B-scan (2.4%), CT-scan (0.9%), among others. Tissue and cellular analysis were conducted in 16.5% of cases, primarily through biopsy (16.4%). Examination under anaesthesia was performed in 31.8% of cases. However, documentation of diagnostic procedures was missing in 37.5% of cases. Ophthalmic evaluations, such as slit lamp and fundoscopy, accounted for 4.2% of the cases, Table 5.

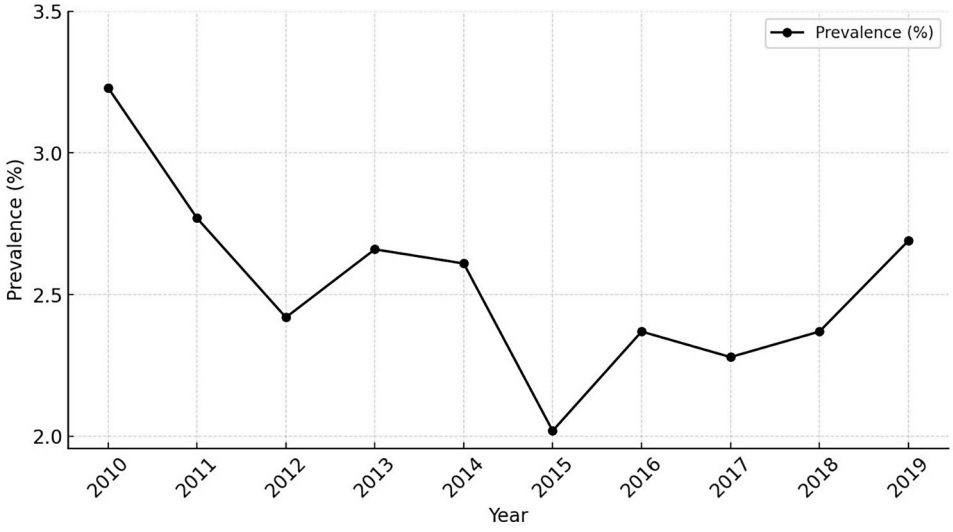

Fig. 1 Prevalence of ocular tumours according to year

Table 3 Presentation of ocular tumours among participants

Variables	Subgroups	Frequency (Percentage)
Laterality	Right eye	444 (43.8)
	Left eye	518 (51.1)
	Both eyes	52 (5.1)
Presenting visual acuity	Normal	181 (17.8)
	Mild visual impairment	12 (1.2)
	Moderate visual impairment	5 (0.5)
	Blindness	276 (27.2)
	Not documented	505 (49.8)
	Following objects	35 (3.5)
Location of tumour	Eyelid	248 (24.5)
	Ocular surface	279 (27.5)
	Intraocular	472 (46.5)
	Orbit	14 (1.4)
	Periorbital	1 (0.1)
Onset of tumour	Congenital	687 (67.8)
	Acquired	308 (30.4)
	Not documented	19 (1.9)
Occurrence	New	972 (95.9)
	Recurrent	39 (3.8)
	Not documented	3 (0.3)
Malignancy	Malignant	437 (43.1)
	Benign	553 (54.5)
	Not documented	24 (2.4)
Total		1014 (100.0)

Methods of ocular tumour management

Surgical procedures were performed in 80.4% of cases, with excision being the most common (47.3%), followed by enucleation (27.2%), and exenteration (4.2%). Medication and therapeutic injections were used in 8.8% of cases, including chemotherapy (6.2%), steroid injections (0.9%), among others. Radiation therapy was rarely used,

Table 4 Distribution of types of ocular tumours among the participants

Variables	Subgroups	Frequency (Percentage)
Malignant ($n=437$ (43.1))	Retinoblastoma	422 (41.6)
	Rhabdomyosarcoma	11 (1.1)
	Squamous cell carcinoma	18 (1.8)
	Optic nerve glioma	4 (0.4)
Benign ($n=553$ (54.5))	Dermoid cyst	210 (20.7)
	Papilloma	62 (6.1)
	Ocular growth unspecified	88 (8.7)
	Cyst	42 (4.1)
	Haemangioma	28 (2.8)
	Granuloma	24 (2.4)
	Lymphoma	23 (2.3)
	Polyp	12 (1.2)
	Others	46 (4.5)
Orbital tumour unspecified		24 (2.4)
Total		**1010 (100.0)**

Table 5 Methods of ocular tumour assessment

Variables	Subgroups	Frequency (Percentage)
Imaging ($n=101$)	MRI	66 (6.5)
	CT-scan	9 (0.9)
	B-scan	24 (2.4)
	Ultrasound scanning	1 (0.1)
	Skull X-ray	1 (0.1)
Tissue and cellular analysis ($n=167$)	Biopsy	166 (16.4)
	Culture	1 (0.1)
Examination under Anaesthesia		322 (31.8)
Not documented		380 (37.5)
Ophthalmic evaluations (slit-lamp, fundoscopy, etc.)		44 (4.2)
Total		**1010 (100.0)**

with only one case (0.1%) receiving beam radiation. Palliative and supportive care was provided in few cases and discharge, referral, or observation was noted in 7% of cases (Table 6).

Table 6 Methods of ocular tumour management

Variables	Subgroups	Frequency (Percentage)
Surgical procedures ($n=815$ (80.4))	Enucleation	276 (27.2)
	Exenteration	43 (4.2)
	Excision	480 (47.3)
	Others	16 (1.6)
Medication/Therapeutic injections ($n=89$ (8.8))	Chemotherapy	63 (6.2)
	Steroid injection	9 (0.9)
	Propranolol	7 (0.7)
	Depo injection	5 (0.5)
	Others (Augmentin and oral steroids)	5 (0.5)
Radiation therapy	Beam radiation	1 (0.1)
Palliative and supportive care	Palliative care	35 (3.5)
Discharge/referral/observation	Discharge on request/ refused treatment	15 (1.5)
	Referred	35 (3.5)
	Kept under observation	7 (0.7)
Not documented		17 (1.7)
Total		**1010 (100.0)**

Discussion

This retrospective review offers valuable insights into the epidemiological trends, clinical presentation, and management challenges associated with ocular tumours among Malawian paediatric patients presenting to tertiary hospitals from 2010 to 2019. The prevalence of ocular tumours among paediatric patients in this study was 2.51%, with fluctuations peaking at 3.23% in 2010 and dipping to 2.02% in 2015. This trend might reflect improvements in early detection and preventive measures, or alternatively, it could indicate reporting gaps or under-diagnosis in certain years.

Our study identified children aged 3 to 5 years as the most affected age group, consistent with other research emphasizing early childhood as a critical period for developing tumors such as retinoblastoma [10, 13]. In alignment with our findings, Musa et al. also recorded a higher prevalence of unilateral tumors, with unilateral cases (68%) being more common than bilateral cases (32%) [22]. However, we observed a divergence in our results regarding the location of tumors. Musa et al. reported a higher prevalence of right-eye tumors (64.3%) compared to left-eye tumors (35.7%) [22], while our study found different proportions. This discrepancy could be attributed to several factors. First, variations in sample size and the specific populations studied can lead to differences in prevalence rates. For instance, demographic factors such as ethnicity, socioeconomic status, or geographic location might influence the types and locations of tumors observed. Second, differences in methodology, including diagnostic criteria and classification of tumors, could account for varying results. If one study used a more stringent definition or different imaging techniques, it might capture cases differently. Additionally, the period during which the studies were conducted could introduce variability. Changes in environmental factors, access to healthcare, or awareness of ocular tumors over time might impact the prevalence and types of tumors identified. Genetic factors could also play a role, as variations in genetic predisposition among different populations may lead to differences in tumor types and their locations. Finally, referral bias may contribute to these findings; if one study primarily included patients referred for specialized treatment while another included all diagnosed cases, the prevalence of certain tumor types could vary significantly. Understanding these nuances is crucial for contextualizing our findings and can inform future research in this area.

Most tumors were intraocular, with the retina identified as the most affected site, aligning with findings from Suleiman et al. in Nigeria [23]. In contrast, Roy et al. (2022) reported minimal involvement of regions such as the nasolacrimal sac and medial canthus, where dermoid cysts were more prevalent [24]. This discrepancy in findings could be attributed to several factors including differences in sample size and patient demographics. For instance, Castillo's study may have analyzed a population with different characteristics or risk factors, affecting the incidence of specific tumor types. Additionally, methodological differences in how tumors were diagnosed and classified could lead to varying results.

Our study found that most of the cases were congenital, an expected finding given the study's paediatric focus. However, it is challenging to confirm the congenital nature of all cases due to possible delays in presentation, as Schwering et al. noted that financial constraints and initial asymptomatic presentation often delay families from seeking care [23]. In addition, Chuka-Okosa et al. noted that many parents first turn to spiritual healers or traditional remedies before seeking hospital care, often due to a lack of awareness about tumor symptoms [25]. Early diagnosis and treatment, especially for complex congenital tumors like retinoblastoma, are essential for better outcomes, as delays can lead to advanced disease and poorer prognosis [25, 26].

In this study, we found that more than half of the ocular tumours were benign, with dermoid cyst as the most prevalent benign tumour and retinoblastoma as the most

malignant tumour (41.6%). These findings are consistent with global trends [5, 6], however, the occurrence of other malignancies such as rhabdomyosarcoma and optic nerve glioma, though less frequent, underscores the heterogeneity of tumour types in the Malawian paediatric population. In contrast to our study, Zarrabi et al. (2023) recorded Rhabdomyosarcoma as the most common orbital malignant tumour [27]. Individually, retinoblastoma had a higher occurrence rate in the current study compared to other tumors, highlighting the possibility for children with retinoblastoma to be referred to a tertiary health care facility because of its vision and life-threatening implications, compared to other benign and non-vision-threatening tumors like dermoid cyst. Given these risks, early detection of ocular and orbital tumours is crucial to improving treatment outcomes and preventing serious complications in children.

Diagnostic challenges and gaps striking finding of this study is the underutilization of advanced diagnostic imaging and tissue analysis, with only 10% of cases undergoing imaging and 16.5% undergoing biopsy. This limited use of diagnostic tools may be attributable to the lack of resources, including imaging equipment and trained personnel, in low-resource settings like Malawi [28]. Furthermore, the high rate of undocumented visual acuity (49.8%) suggests potential lapses in clinical documentation or late presentations in which vision may have already deteriorated.

The study revealed that most cases (80.4%) were managed surgically, with excision (47.3%) and enucleation (27.2%) being the most common procedures. This reliance on surgical intervention aligns with global trends in the management of advanced ocular tumours, where timely surgery can be critical for survival and preservation of life, especially in the case of malignant tumours [18]. However, the low use of adjunct therapies such as chemotherapy (6.2%) and radiation therapy (0.1%) may reflect both a lack of access to these treatment modalities and limited infrastructure for multidisciplinary cancer care in Malawi [7].

This study underscores the urgent need for strengthening the health system's capacity to manage paediatric ocular tumours in Malawi. Enhancing access to diagnostic technologies such as MRI, B-scans, and histopathological analysis is essential for accurate diagnosis and staging of tumours. Additionally, improving clinical documentation and follow-up care is vital for better patient outcomes. The study also highlights the importance of integrating oncological care within the ophthalmic services in Malawi's healthcare system. Future research should focus on longitudinal studies to assess survival rates, long-term outcomes of different treatment modalities, and the psychosocial impact of these tumours on children and their families. Additionally, exploring cost-effective interventions for early screening and treatment, especially in low-resource settings, is crucial for improving paediatric eye care outcomes.

Strengths and limitations

This study had some limitations due to its retrospective nature, relying only on patient files from Ophthalmology departmental records and hospital archives, which may not reflect current prevalence rates. Some files were missing, resulting in incomplete data capture. Also, specific details of some treatment given to the patients were not captured and could not be verified due to the retrospective nature of the study. Additionally, the study focused on public tertiary hospitals, meaning that some benign tumours might have been treated locally without referral, and documentation did not account for patient referrals between hospitals, leading to potential double-counting. As a result, the findings cannot be fully generalized to all children with ocular tumours during the study period. Despite the limitations, our study addresses a significant public health issue and provides valuable information for health policymakers and practitioners. By focusing on pediatric age groups, we gained a detailed understanding of ocular tumor prevalence in this vulnerable population. This study is the first to report the prevalence of ocular tumors in Malawi, establishing a baseline for future research and enabling the tracking of changes over time. Additionally, it raises awareness, promotes early detection, and informs tailored interventions and resource allocation. The sample size is sufficiently large to offer meaningful insights into the prevalence and distribution of ocular tumors in Malawi.

Conclusion

This comprehensive review of ocular tumours among Malawian children sheds light on the significant challenges faced in diagnosing and managing these conditions. The high prevalence of malignancies such as retinoblastoma, coupled with diagnostic and therapeutic limitations, calls for urgent attention to improve paediatric oncology services in Malawi. Policymakers and healthcare providers must prioritize investments in diagnostic infrastructure, training, and integrated care pathways to enhance the management of paediatric ocular tumours and improve survival rates. Furthermore, raising community awareness about ocular tumors is vital. It is equally important for eye care practitioners to meticulously document patient information, including visual acuity and referral details, to improve overall patient outcomes.

Abbreviations

CI Confidence intervals
SPSS Statistical Package for the Social Sciences

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12886-025-04091-y.

Supplementary Material 1

Supplementary Material 2

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N/A.

Author contributions
MAK, POA and OMO analyzed and interpreted the data regarding the prevalence of ocular tumors, as well as revised the manuscript. GOO, NEE, MC and RCO conceptualized the study, collected the data, and drafted the manuscript. All authors read and approved the final manuscript.

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Data availability
The data is provided as a tables and figure, however, the raw data is available upon reasonable request from the corresponding author.

Declarations

Ethics approval and consent to participate
The approval for this study was gotten from the National Health Science Research Committee (NCHRS) with ethical clearance number 2543 and Research Ethics Committee, Faculty of Health Sciences, Mzuzu University. In addition, permission to access the patients' records was sought and gotten from the study centres, through their research ethics committees. Due to the retrospective nature of the study and the absence of direct human contact of the researcher and the participants, the need for consent to participate in the study was waived by the Research Ethics Committee, Faculty of Health Sciences, Mzuzu University. The study followed the outlined protocols for data collection as specified by the research policies of the various hospitals involved in the study. Furthermore, the study thereafter adhered to the Helsinki principles by ensuring that patients' anonymity was maintained via the codification of patients' details and no harm came to the patients during and after the course of the study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Department of Optometry, Faculty of Health Sciences, Mzuzu University, Mzuzu, Malawi
[2]Optometry Unit, Department of Clinical Surgical Sciences, Faculty of Medical Sciences, The University of the West Indies, Trinidad and Tobago, St Augustine Campus, Port of Spain, Trinidad and Tobago
[3]Bathurst Rural Clinical School, Western Sydney University, Sydney, Australia
[4]Abia State Specialist Hospital, Umuahia, Abia State, Nigeria
[5]Life Science Nigeria, Umuahia, Nigeria
[6]Department of Optometry, College of Medical and Health Sciences, Novena University, Ogume, Delta State, Nigeria
[7]Department of Optometry, Faculty of Life Sciences, University of Benin, Benin City, Nigeria

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