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Pattern of Ocular Ultrasonographic Findings at a Tertiary Hospital in Northwest Nigeria: A Retrospective Review

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Abstract

Background: Ocular ultrasonography is a safe, non-invasive and accessible imaging modality for evaluating ocular and orbital disease, especially when media opacity limits direct visualization. Objective: To determine the pattern of ocular ultrasonographic findings among patients examined at Federal Teaching Hospital Birnin Kebbi, Northwestern Nigeria. Materials and methods: This retrospective descriptive cross-sectional study reviewed records of all patients who underwent ocular ultrasonography between January 2020 and December 2024. Age, sex, clinical indications, laterality and sonographic findings were extracted and analysed with SPSS version 25 using descriptive statistics and Chi-square tests, with significance set at $p < 0.05$. Results: A total of 158 examinations were reviewed; 93 patients (58.9%) were male and 65 (41.1%) were female. Cataract was the commonest indication, accounting for 40 cases (25.3%). The most frequent sonographic findings were cataract (34; 21.5%), retinal detachment (25; 15.8%) and vitreous haemorrhage (22; 13.9%). Normal findings were recorded in 17 patients (10.8%). Cataract was significantly associated with advancing age, while retinoblastoma occurred only in children. Conclusion: Ocular ultrasonography demonstrated a high diagnostic yield and remains valuable for evaluating cataract-related media opacity, posterior segment pathology, trauma and paediatric ocular abnormalities in this setting.

Keywords: Ocular Ultrasonography, Cataract, Retinal Detachment, Vitreous Haemorrhage, Retinoblastoma, Northwestern Nigeria

Introduction

Visual impairment and blindness remain major public health concerns worldwide, particularly in low- and middle-income countries where access to specialized eye care services is often limited. The World Health Organization estimates that millions of individuals suffer from visual impairment due to preventable or treatable ocular diseases, many of which can be effectively managed when diagnosed early. Conditions such as cataract, retinal detachment, vitreous haemorrhage, diabetic retinopathy, ocular trauma, intraocular tumours, and congenital ocular anomalies continue to contribute substantially to visual morbidity, reduced productivity, and diminished quality of life worldwide [1, 2, 30].

Accurate diagnosis is essential for the successful management of ocular diseases. Although clinical ophthalmologic examination remains the cornerstone of ocular assessment, visualization of intraocular structures may be severely limited when the ocular media become opaque due to cataract, corneal opacity, vitreous haemorrhage, hyphema, endophthalmitis, or severe ocular trauma. In such situations, diagnostic imaging serves as an indispensable adjunct to clinical evaluation and treatment planning [8, 9].

Ocular ultrasonography is one of the most widely utilized imaging modalities in ophthalmology because it is safe, non-invasive, relatively inexpensive, readily available, and free from ionizing radiation. Since its introduction into ophthalmic practice by Mundt and Hughes in the 1950s, ultrasound has evolved into an essential diagnostic tool for the assessment of ocular and orbital diseases.3 The superficial location of the eye and its fluid-filled anatomy make it particularly amenable to sonographic evaluation. B-mode ultrasonography provides real-time visualization of the globe, vitreous cavity, retina, choroid, optic nerve, and orbital structures, thereby facilitating the diagnosis of lesions that may not be visible on routine clinical examination [4-7, 9].

The usefulness of ocular ultrasonography has been demonstrated in a broad spectrum of ophthalmic disorders, including retinal

detachment, vitreous haemorrhage, posterior vitreous detachment, lens dislocation, intraocular foreign bodies, endophthalmitis, choroidal abnormalities, orbital masses, and traumatic ocular injuries [4-9]. It is particularly valuable in patients with opaque ocular media and in emergency situations where rapid assessment of intraocular integrity is required [8-10]. In addition, ocular ultrasound plays a critical role in the pre-operative evaluation of cataract patients by detecting occult posterior segment abnormalities that may influence surgical planning and visual prognosis [19].

Beyond acquired ocular disorders, ultrasonography also contributes significantly to the evaluation of congenital and paediatric ocular diseases. Congenital anomalies such as anophthalmia and microphthalmia are rare developmental disorders associated with severe visual impairment and substantial psychosocial consequences. Early imaging is essential for confirming the diagnosis, assessing residual ocular structures, and identifying associated orbital abnormalities [26-29]. Similarly, ocular ultrasonography remains an important diagnostic tool in the evaluation of retinoblastoma, the most common primary intraocular malignancy of childhood. The modality facilitates the detection of intraocular masses and tumour-related calcifications, particularly in resource-limited settings where advanced imaging modalities may not be readily accessible [23-25].

Several studies conducted in different parts of the world have reported varying patterns of ocular ultrasonographic findings. In India, Bangal *et al*. reported ocular trauma as a major indication for B-scan ultrasonography, with posterior vitreous detachment, retinal detachment, and vitreous haemorrhage among the most common findings [20]. Studies from Pakistan and other developing countries have similarly highlighted the importance of ocular ultrasonography in identifying occult posterior segment lesions in patients with dense cataracts and other media opacities [19].

In Africa, ocular ultrasonography continues to play a pivotal role in ophthalmic diagnosis because of its affordability, accessibility, and diagnostic accuracy. Reports from the Democratic Republic of Congo, Sudan, and other Sub-Saharan African countries have demonstrated its utility in the evaluation of retinal disorders, ocular trauma, cataract-related posterior segment pathology, and orbital lesions [14, 15]. Similar observations have been reported in Nigeria, where studies from Benin, Ilorin, Delta State, Uyo, Ile-Ife, and Zaria consistently identified retinal detachment, vitreous haemorrhage, cataract, and trauma-related abnormalities among the most frequent sonographic findings [10-18].

Despite the increasing use of ocular ultrasonography in Nigeria, published data remain limited in many parts of the country, particularly within the North-West geopolitical zone. Most available studies originate from southern Nigeria or a few selected centres, creating an important gap in regional epidemiological data. Understanding the local pattern of ocular ultrasonographic findings is essential for improving diagnostic services, guiding resource allocation, supporting training programmes, and informing evidence-based clinical practice.

Federal Teaching Hospital Birnin Kebbi serves as a major referral centre for Kebbi State and neighbouring communities in Northwestern Nigeria and manages patients presenting with a wide spectrum of ocular disorders requiring ultrasonographic evaluation. However, there is limited published information regarding the pattern of ocular ultrasonographic findings encountered in this environment. This study was therefore undertaken to determine the pattern of ocular ultrasonographic findings among patients who underwent ocular ultrasound examinations at Federal Teaching Hospital Birnin Kebbi. The findings are expected to provide baseline data for clinicians, radiologists, ophthalmologists, and health planners while contributing to the growing body of literature on ocular imaging in Nigeria.

Materials and Methods

Study Design

This study was a retrospective descriptive cross-sectional review of ocular ultrasonography examinations performed at the Department of Radiology, Federal Teaching Hospital Birnin Kebbi, Kebbi State, Nigeria.

Study Area

The study was conducted at the Radiology Department of Federal Teaching Hospital Birnin Kebbi, a tertiary healthcare institution located in Birnin Kebbi, Northwestern Nigeria. The hospital serves as a major referral centre for Kebbi State and neighbouring states, providing specialized radiological and ophthalmological services to patients from urban and rural communities.

Study Population

The study population comprised all patients who underwent ocular ultrasonography at the Radiology Department of Federal Teaching Hospital Birnin Kebbi during the study period.

Study Period

The study reviewed the records and reports of patients who underwent ocular ultrasonography performed over a five-year period from January 1, 2020, to December 31, 2024.

Inclusion Criteria

All patients who underwent ocular ultrasonography during the study period were eligible for inclusion in the study. Only patients with complete demographic and clinical information, as well as definitive sonographic findings and documented radiological diagnoses in the ultrasound reports, were included in the analysis.

Exclusion Criteria

Records with incomplete demographic or clinical information were excluded from the study. Ultrasound reports with inconclusive sonographic findings, duplicate records of the same examination, and poor-quality studies in which sonographic interpretation was not possible were also excluded from the analysis.

Sample Size and Sampling Technique

A total sampling technique was employed. All eligible ocular ultrasound examinations performed during the study period that met the inclusion criteria were included in the study. Consequently, no formal sample size calculation was required.

Data Collection

Data were extracted from archived ultrasound reports, radiology registers, and electronic databases where available using a structured data extraction proforma designed for the study.

Study Variables

Data extracted from the records included sociodemographic, clinical, and sonographic variables. The sociodemographic variables comprised age and sex of the patients. Clinical variables included the indication for ocular ultrasonography and the side examined (right eye, left eye, or bilateral involvement).

The sonographic variables included the presence or absence of ocular abnormalities and the specific ultrasonographic diagnoses recorded. These comprised cataract, vitreous haemorrhage, retinal detachment, posterior vitreous detachment, lens dislocation, choroidal detachment, endophthalmitis, intraocular foreign body, retinoblastoma, orbital masses, phthisis bulbi, and other ocular abnormalities. Normal ultrasound findings were also documented. Where multiple abnormalities were identified in the same eye or patient, all sonographic findings were recorded and analysed accordingly.

Ultrasonographic Technique

Ocular ultrasonography was performed using high-frequency linear transducers ranging from 7.5 MHz to 12 MHz, depending on machine availability and patient characteristics. Examinations were performed with the patient in the supine position and the eyelids gently closed. Acoustic coupling gel was applied over the closed eyelid, and scanning was performed in transverse, longitudinal, and oblique planes to ensure complete evaluation of the globe and orbital contents.

Dynamic assessment was performed when necessary by instructing patients to move their eyes in different directions while maintaining eyelid closure. The examinations were performed and/or supervised by consultant radiologists with experience in ocular ultrasonography.

Data Analysis

Data were entered into Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA).

Descriptive statistics were used to summarize the data. Continuous variables such as age were presented as mean +/- standard deviation (SD), median, and range where appropriate. Categorical variables were summarized using frequencies and percentages.

Associations between categorical variables such as age groups, sex, and sonographic findings were assessed using the Chi-square test or Fisher's exact test where appropriate. Statistical significance was set at a p-value of less than 0.05.

Ethical Considerations

Ethical approval for the study was obtained from the Health Research Ethics Committee of Federal Teaching Hospital Birnin Kebbi before commencement of the study. Patient confidentiality was maintained throughout the study by anonymizing all extracted data and removing personal identifiers. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki for research involving human participants.

Results and Discussion

A total of 158 ocular ultrasonography examinations performed between January 2020 and December 2024 were reviewed. Of these, 93 (58.9%) were males and 65 (41.1%) were females, giving a male-to-female ratio of 1.4:1. The patients' ages ranged from birth to 89 years. The highest proportion of patients was observed within the fourth to sixth decades of life, while paediatric patients constituted a substantial proportion of referrals.

Demographic Characteristics

Males predominated across most age groups. The largest proportion of patients was within the 31-40-year age group, followed closely by those aged 41-50 years and 51-60 years. Paediatric patients (0-20 years) accounted for a notable proportion of the study population, reflecting the inclusion of congenital anomalies, retinoblastoma, trauma-related ocular disorders, and inflammatory conditions.

Table 1: Age and Sex Distribution of Patients

Age group (years)	Male	Female	Total	Percentage (%)
0-10	9	7	16	10.1
11-20	8	6	14	8.9
21-30	11	6	17	10.8
31-40	16	8	24	15.2
41-50	14	9	23	14.6
51-60	12	10	22	13.9
61-70	11	9	20	12.7
71-80	8	6	14	8.9
81-90	4	2	6	3.8
Total	93	65	158	100.0

Clinical Indications for Ocular Ultrasonography

Cataract or pre-operative cataract assessment was the commonest indication, accounting for 40 (25.3%) cases. This was followed by poor vision or visual loss in 24 (15.2%) patients, suspected retinal detachment in 15 (9.5%), and suspected vitreous haemorrhage in 13 (8.2%).

Trauma-related conditions, including corneo-scleral laceration, dislocated lens, hyphaema, and ruptured globe, collectively represented a substantial proportion of referrals. Other indications included orbital tumours, inflammatory and infective ocular conditions, corneal opacity, glaucoma, proptosis, post-surgical assessment, floaters, congenital anophthalmia, microphthalmia, and staphyloma.

Table 2: Clinical Indications for Ocular Ultrasonography

Clinical indication	Frequency	Percentage (%)
Cataract / pre-operative cataract assessment	40	25.3
Poor vision / visual loss	24	15.2
Suspected retinal detachment	15	9.5
Suspected vitreous haemorrhage	13	8.2
Corneo-scleral laceration / ocular trauma	12	7.6
Dislocated lens	7	4.4
Orbital tumour	6	3.8
Inflammation / infection	5	3.2
Uveitis	5	3.2
Hyphaema	4	2.5
Corneal opacity	4	2.5
Proptosis	4	2.5
Glaucoma	3	1.9
Post-surgical evaluation	3	1.9
Floaters	3	1.9
Eye pain	2	1.3
Congenital anophthalmia	2	1.3
Microphthalmia	3	1.9
Staphyloma	3	1.9
Total	158	100.0

Sonographic Findings

Cataract was the most frequent sonographic diagnosis, occurring in 34 (21.5%) patients. Retinal detachment and vitreous haemorrhage were the second and third most common findings, accounting for 25 (15.8%) and 22 (13.9%) cases, respectively.

Normal sonographic findings were observed in 17 (10.8%) patients. Other notable abnormalities included posterior vitreous detachment, endophthalmitis, staphyloma, orbital tumours, retinoblastoma, dislocated lens, orbital cellulitis, pseudophakia, microphthalmia, ruptured globe, phthisis bulbi, and congenital bilateral anophthalmia.

Overall, abnormal sonographic findings were identified in 141 (89.2%) patients, underscoring the high diagnostic yield of ocular ultrasonography in the evaluation of ophthalmic disorders.

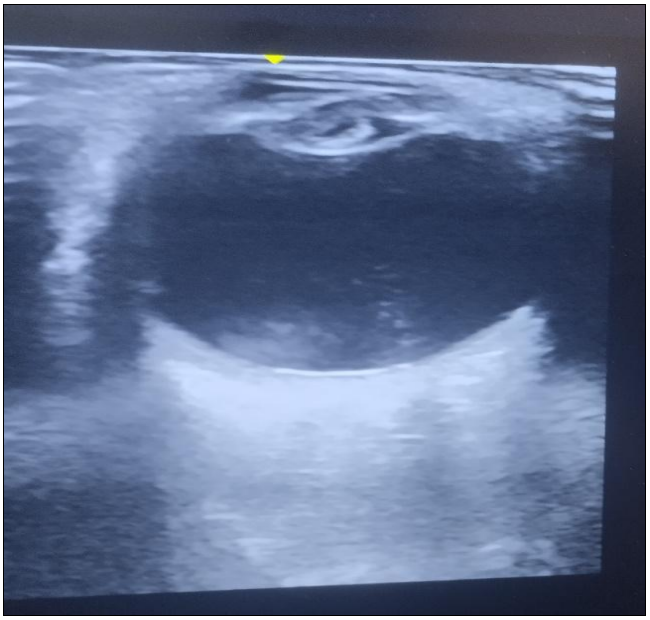

Fig 1: Longitudinal B-mode ultrasound of the right eye in a 23-year-old male showing a mature cataract characterized by a densely echogenic lens with posterior acoustic shadowing

Table 3: Primary Sonographic Findings

Sonographic finding	Frequency	Percentage (%)
Cataract	34	21.5
Retinal detachment	25	15.8
Vitreous haemorrhage	22	13.9
Normal ultrasound findings	17	10.8
Posterior vitreous detachment	11	7.0
Endophthalmitis	8	5.1
Staphyloma	7	4.4
Orbital tumour	6	3.8
Retinoblastoma	5	3.2
Dislocated lens	5	3.2
Orbital cellulitis	4	2.5
Artificial lens implant / pseudophakia	3	1.9
Microphthalmia	3	1.9
Hyphaema	2	1.3
Ruptured globe	2	1.3
Congenital bilateral anophthalmia	2	1.3
Phthisis bulbi	2	1.3
Total	158	100.0

Age Distribution of Sonographic Findings

Cataract demonstrated a progressive increase with advancing age and was most frequently encountered among patients aged 61 years and above. This association was statistically significant (chi-square = 18.6, p = 0.002).

Retinal detachment and vitreous haemorrhage were most commonly observed among young and middle-aged adults, particularly within the 21-60-year age groups. In contrast, retinoblastoma occurred exclusively in children aged between 2 and 6 years, while congenital anophthalmia and microphthalmia were confined to the neonatal age group. The association between age group and retinoblastoma was statistically significant (chi-square = 27.4, $p < 0.001$).

Table 4: Distribution of Major Sonographic Findings by Age Group

Finding	0-20 yrs	21-40 yrs	41-60 yrs	>=61 yrs	Total
Cataract	2	4	10	18	34
Retinal detachment	3	10	8	4	25
Vitreous haemorrhage	4	8	7	3	22
Posterior vitreous detachment	0	3	4	4	11
Endophthalmitis	2	2	3	1	8
Staphyloma	0	2	2	3	7
Orbital tumour	0	1	3	2	6
Retinoblastoma	5	0	0	0	5
Dislocated lens	1	3	1	0	5
Orbital cellulitis	2	1	1	0	4
Microphthalmia	3	0	0	0	3
Congenital anophthalmia	2	0	0	0	2

Sex Distribution of Sonographic Findings

Cataract occurred relatively equally among males and females. However, retinal detachment, vitreous haemorrhage, dislocated lens, and trauma-related abnormalities were more common among males.

Retinal detachment showed a statistically significant male predominance (chi-square = 4.1, p = 0.043). Although vitreous haemorrhage was also more common among males, the difference did not reach statistical significance (chi-square = 3.8, p = 0.051).

Table 5: Distribution of Major Sonographic Findings by Sex

Finding	Male	Female	Total
Cataract	18	16	34
Retinal detachment	17	8	25
Vitreous haemorrhage	16	6	22
Normal ultrasound findings	8	9	17
Posterior vitreous detachment	7	4	11
Endophthalmitis	5	3	8
Staphyloma	3	4	7
Orbital tumour	4	2	6
Retinoblastoma	3	2	5
Dislocated lens	4	1	5
Orbital cellulitis	2	2	4
Artificial lens implant / pseudophakia	1	2	3
Microphthalmia	1	2	3
Hyphaema	2	0	2
Ruptured globe	1	1	2
Congenital bilateral anophthalmia	1	1	2
Phthisis bulbi	0	2	2
Total	**93**	**65**	**158**

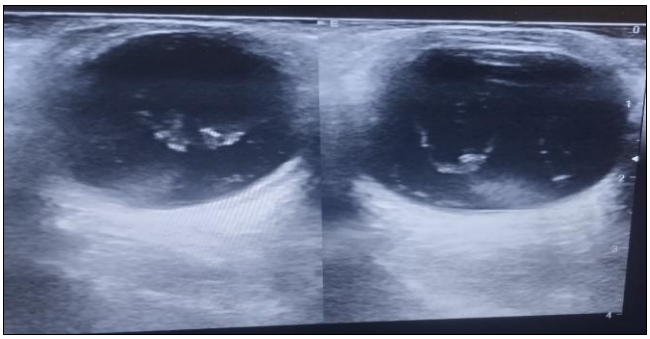

Fig 4: Bilateral B-mode ocular ultrasonography demonstrating multiple heterogeneous moderate- to high-level echogenic opacities within both vitreous cavities, consistent with bilateral vitreous haemorrhages

Laterality of Sonographic Findings

Among the 34 cataract cases, 23 were bilateral, while the remainder were unilateral. Retinal detachment showed a left-sided predominance, with 16 cases involving the left eye compared with 9 cases affecting the right eye.

All cases of retinoblastoma were unilateral, occurring almost equally in the right and left eyes. The two cases of ruptured globe were unilateral, affecting one eye each. Both cases of congenital anophthalmia involved bilateral absence of the globes and were identified in neonates.

Table 6: Laterality of Selected Sonographic Findings

Finding	Right eye	Left eye	Bilateral	Total
Cataract	5	6	23	34
Retinal detachment	9	16	0	25
Vitreous haemorrhage	11	10	1	22
Retinoblastoma	2	3	0	5
Ruptured globe	1	1	0	2
Congenital anophthalmia	0	0	2	2
Microphthalmia	2	1	0	3

Coexisting Sonographic Abnormalities

Multiple sonographic abnormalities were identified in several patients. The most frequent combinations included cataract with retinal detachment, cataract with vitreous haemorrhage, cataract with posterior vitreous detachment, and cataract with vitreous degeneration. Such coexisting abnormalities were particularly common among elderly patients undergoing pre-operative cataract assessment and among patients with longstanding ocular disease.

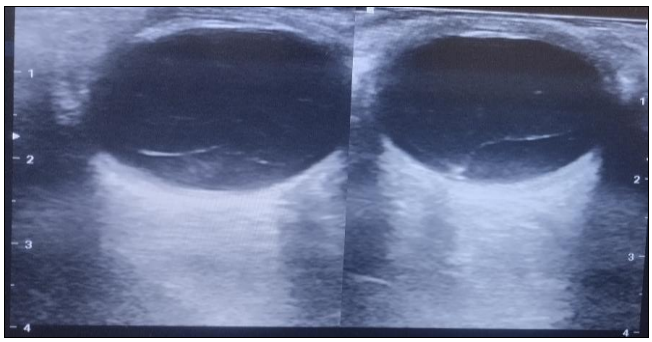

Fig 3: Longitudinal B-mode ultrasonography of both eyes in a 40-year-old male demonstrating a thin freely mobile echogenic membrane within the right vitreous cavity, consistent with posterior vitreous detachment (a), a thick echogenic retinal membrane attached to the optic disc in the left eye, consistent with retinal detachment (b), and multiple low-level internal echoes in both vitreous cavities

Discussion

This study evaluated the pattern of ocular ultrasonographic findings among patients who underwent ocular ultrasound examinations at Federal Teaching Hospital Birnin Kebbi over a five-year period. The findings demonstrate the continuing relevance of B-mode ultrasonography in the diagnosis and evaluation of ocular diseases in a resource-constrained environment. Cataract, retinal detachment, and vitreous haemorrhage constituted the most common sonographic abnormalities, while a variety of congenital, inflammatory, traumatic, and neoplastic lesions were also identified.

A male predominance was observed in this study, with males accounting for 58.9% of the study population and a male-to-female ratio of 1.4:1. This finding is comparable to reports from Delta State and several other Nigerian studies, which similarly documented a higher proportion of males among patients referred for ocular ultrasonography [12, 16]. The observed male predominance may be attributable to greater occupational exposure to ocular trauma, increased participation in outdoor activities, and differences in healthcare-seeking behaviour. Similar findings have been reported in studies from Benin, Ilorin, Sudan, and India [10, 11, 15, 20].

The age distribution observed in this study indicates that ocular diseases requiring ultrasonographic evaluation occur across all age groups. Although the majority of patients were adults, the presence of neonates and children reflects the diversity of ocular disorders managed in the study setting. Similar broad age distributions have been reported in Nigerian and African studies of ocular ultrasonography [12, 14, 17].

Cataract was the most common clinical indication for ocular ultrasonography and also the most frequent sonographic diagnosis. This finding is not unexpected because dense cataracts often obscure direct visualization of the posterior segment, necessitating ultrasonographic evaluation before surgical intervention. The predominance of cataract-related referrals observed in this study is consistent with reports from Pakistan, Uyo, Ibadan, and Delta State, where cataract constituted one of the leading indications for ocular ultrasound examinations [12, 17, 19]. The significant association between cataract and advancing age observed in this study further reflects the established epidemiology of age-related lens opacification.

Retinal detachment was the second most common sonographic finding. This observation is consistent with findings reported by Ikubor and Abadom in Delta State, where retinal detachment was the most frequent sonographic diagnosis [12]. Similar findings have been documented in studies from Benin, Uyo, and Kinshasa [10, 14, 17]. Retinal detachment remains one of the most important causes of severe visual impairment and blindness, particularly when diagnosis and treatment are delayed. The relatively high prevalence observed in the present study may reflect delayed presentation, limited access to specialist ophthalmic services, and the contribution of trauma and vitreoretinal disease within the study population. Although retinal detachment was more frequently observed in the left eye, no clear biological explanation exists for this distribution, and the finding may represent random variation within the study population.

Vitreous haemorrhage was the third most common sonographic abnormality identified. This finding agrees with

reports from Benin, Zaria, Ilorin, and Delta State, where vitreous haemorrhage ranked among the leading posterior segment pathologies detected on ocular ultrasound [10-12, 16]. Vitreous haemorrhage commonly results from ocular trauma, retinal tears, proliferative diabetic retinopathy, retinal vascular occlusions, and other vitreoretinal disorders. The ability of ultrasonography to identify vitreous haemorrhage and detect associated retinal pathology further emphasizes its importance in clinical practice. In a recent diagnostic accuracy study, ocular ultrasound demonstrated good sensitivity for detecting vitreous haemorrhage, reinforcing its value as a first-line imaging modality in ophthalmology [21].

Posterior vitreous detachment constituted a notable proportion of abnormalities in the present study. Similar observations have been reported in retinal clinic audits and studies involving elderly populations, where age-related vitreous degeneration is common [17, 20]. Because posterior vitreous detachment may predispose to retinal tears and subsequent retinal detachment, its identification is clinically important and often necessitates careful ophthalmologic follow-up.

Normal sonographic findings were observed in 10.8% of patients. This proportion is remarkably similar to the 10.4% reported in the Delta State study [12]. Although normal ultrasound findings may appear clinically insignificant, they are important because they help exclude major posterior segment pathology, support clinical decision-making, and provide reassurance in patients with poor fundal visualization.

One of the notable findings of this study was the identification of five cases of retinoblastoma, all occurring in children aged between 2 and 6 years. Retinoblastoma is recognized as the most common primary intraocular malignancy of childhood and remains a major cause of childhood blindness and ocular morbidity worldwide [23-25]. The age distribution observed in this study is consistent with global reports indicating that most cases occur before five years of age. The unilateral presentation observed in all cases is also compatible with the predominance of sporadic retinoblastoma reported in many developing countries [24, 25]. Early diagnosis is particularly important because delayed presentation remains a major challenge in low-resource settings and is associated with poorer visual and survival outcomes [23].

The study also documented rare congenital ocular anomalies, including bilateral congenital anophthalmia and microphthalmia. Although uncommon, these conditions represent severe developmental abnormalities associated with profound visual impairment and significant psychosocial consequences. The identification of these anomalies highlights the usefulness of ultrasonography in confirming the diagnosis and evaluating residual ocular structures in neonates and young infants. Recent studies have emphasized the importance of early imaging and multidisciplinary management involving ophthalmologists, radiologists, paediatricians, and genetic specialists in improving outcomes for affected children [26-29]. The documentation of these rare anomalies provides valuable epidemiological information and distinguishes the present study from many previous Nigerian ocular ultrasound audits.

Endophthalmitis, staphyloma, orbital cellulitis, orbital tumours, ruptured globe, dislocated lens, and phthisis bulbi were among the less common abnormalities encountered. Although individually infrequent, these conditions collectively illustrate the broad diagnostic spectrum of ocular ultrasonography. Ultrasound remains particularly valuable in inflammatory and infective ocular disorders where media opacity limits direct clinical examination [4, 5, 9].

Several patients demonstrated multiple coexisting sonographic abnormalities, most commonly cataract with retinal detachment, cataract with vitreous haemorrhage, and cataract with posterior vitreous detachment. Similar associations have been reported in studies evaluating pre-operative cataract patients, where ultrasonography frequently revealed occult posterior segment pathology not detected on routine ophthalmologic examination [19]. These findings reinforce the importance of routine ocular ultrasound assessment in selected patients with dense cataracts and poor visualization of the posterior segment.

Overall, the findings of this study are broadly consistent with previous reports from Nigeria, Sub-Saharan Africa, and other developing regions. However, the identification of uncommon congenital anomalies and paediatric ocular tumours provides additional insight into the spectrum of ocular diseases encountered in Northwestern Nigeria. The study further confirms that ocular ultrasonography remains a highly valuable, accessible, safe, and cost-effective imaging modality for the evaluation of ophthalmic disorders, particularly in environments where access to advanced imaging techniques may be limited.

Conclusion

Cataract, retinal detachment and vitreous haemorrhage were the leading ocular ultrasonographic findings in this five-year review. The study highlights the high diagnostic value of ocular ultrasonography in patients with opaque ocular media, suspected posterior segment disease, trauma and paediatric ocular abnormalities. Strengthening access to ocular ultrasound and maintaining close collaboration between ophthalmology and radiology services may improve diagnosis, referral decisions and clinical outcomes in Northwestern Nigeria.

Ethical Approval

Ethical approval for this study was obtained from the Health Research Ethics Committee of Federal Teaching Hospital Birnin Kebbi prior to commencement of the study. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Patient confidentiality was maintained throughout the study by anonymizing all extracted data and removing personal identifiers.

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References

1. World Health Organization. World report on vision. Geneva: World Health Organization, 2019.
2. Resnikoff S, Pascolini D, Etya'ale D, Kocur I, Pararajasegaram R, Pokharel GP, *et al*. Global data on visual impairment in the year 2002. Bull World Health Organ. 2004; 82(11):844-851.

3. Thylefors B, Negrel AD, Pararajasegaram R, Dadzie KY. Global data on blindness. Bull World Health Organ. 1995; 73(1):115-121.
4. Mundt GH, Hughes WF. Ultrasonics in ocular diagnosis. Am J Ophthalmol. 1956; 41(3):488-498.
5. Byrne SF, Green RL. Ultrasound of the Eye and Orbit. 2nd ed. St Louis: Mosby, 2002.
6. Coleman DJ, Silverman RH. Diagnostic Ultrasound of the Eye and Orbit. 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2006.
7. Silverman RH. High-resolution ultrasound imaging of the eye: A review. Clin Exp Ophthalmol. 2009; 37(1):54-67.
8. Shukla S, Nema N, Nema HV. Diagnostic ophthalmic ultrasonography. Indian J Ophthalmol. 2006; 54(1):1-10.
9. Horowitz R, Bailitz J. Ocular ultrasound. Pediatr Emerg Care. 2015; 31(3):220-227.
10. Uduma FU, Akpan SI, Njeze NR. B-scan ophthalmic ultrasonography: A review corroborated with echograms. New Front Ophthalmol. 2019; 5(1):1-5.
11. American Institute of Ultrasound in Medicine. Practice guideline for the performance of ophthalmic ultrasound examinations. J Ultrasound Med. 2017; 36(11):e43.
12. Adeyekun AA, Ozougwu SN, Efe-Aluta EE, Ese-Onakewhor JN. Correlation of clinical and ultrasound findings in ocular trauma at the University of Benin Teaching Hospital, Nigeria. Borno Med J.
13. Nzeh DA, Owoeye JFA. Sonographic evaluation of ocular trauma in Ilorin, Nigeria. Niger J Surg Res.
14. Ikubor JE, Abadom EG. Ultrasonographic evaluation of ophthalmic diseases at Delta State University Teaching Hospital, Oghara, Delta State, Nigeria. Niger J Med. 2022; 31(3):333-338.
15. Eze BI, Onu AC, Imo AO, Mgbor SO. Utility and effectiveness of orbito-ocular B-scan ultrasonography in an African developing country. J Health Care Poor Underserved. 2013; 24(4):1440-1447.
16. Ngweme G, Bambi MTN, Lutete LF, Kilangalanga NJ, Hopkins A, Stachs O, *et al*. Ophthalmic ultrasonography in Sub-Saharan Africa: A Kinshasa experience. Diagnostics. 2021; 11(11):2009.
17. Yusuf AYA, Howaida H. B-scan ultrasonography in ocular trauma in Al-Obeid, Sudan. Verify Journal Details from PDF.
18. Mustapha AH, Aiyekomogbon JO, Halilu SD, Salihu AY. Pattern of ocular B-mode sonographic findings in diabetic ophthalmopathy in Zaria, Nigeria. Verify Journal Details from PDF.
19. Megbelayin EO, Babalola OE, Nkanga DG, *et al*. Ocular B-scan audit in a retina clinic in Sub-Saharan Africa. Verify Journal Details from PDF.
20. Asaleye CM, Olatunji RB, Onakpoya OH, Ojo TO, Ijadunola MY, Ajayi IA, *et al*. Ocular ultrasonography in Ile-Ife: Incidental findings in the apparently normal eye and implications for ocular health. Afr J Med Health Sci. 2018; 17(2):56-62.
21. Qureshi MA, Laghari K. Role of B-scan ultrasonography in pre-operative cataract patients. Int J Health Sci. Verify Volume and Pages from PDF.
22. Bangal SV, Bhandari AJ, Siddiqui F. Pattern of ocular pathologies diagnosed with B-scan ultrasonography in a hospital in rural India. Niger J Ophthalmol.
23. Habib A, Altuf L, Zafar FS, Akram Z, Fatima F, Raza MA, *et al*. Diagnostic accuracy of ocular ultrasound in the assessment of vitreous haemorrhage and associated ocular diseases. J Health Rehabil Res, 2024. Verify pages from PDF.
24. Nag A, Gupta R, Sharma P, *et al*. Retinoblastoma: A comprehensive review, update and recent advances. Indian J Ophthalmol, 2024.
25. Cruz-Galvez CC, Rodriguez-Galindo C, Wilson MW. Retinoblastoma: Review and new insights. Front Oncol. 2022; 12:963780.
26. Kaur K, Singh P, Gupta M. Retinoblastoma. In: StatPearls. Treasure Island (FL): StatPearls Publishing, 2025.
27. Frech S, Muller H, Hoffmann EM, *et al*. Clinical congenital anophthalmos and microphthalmos: Current concepts and management. Children (Basel). 2022; 10(1):34.
28. Russo M, Frech S, Muller H, *et al*. Management of anophthalmia, microphthalmia and coloboma: Current perspectives. Children (Basel), 2025.
29. Fahnehjelm C, Dahl S, Martin L, *et al*. Anophthalmia and microphthalmia in children: Ocular outcomes and associated morbidity. Strabismus. 2022; 30(1):1-10.
30. Periyandavan J, Nair AG, Thomas R. A brief review on microphthalmia and anophthalmia. Kerala J Ophthalmol. 2024; 36(3):215-221.