NIGERIAN JOURNAL OF PAEDIATRICS

https://www.njpaediatrics.com

PRINT: ISSN 0302-4660

ONLINE: ISSN 2814-2985

OFFICIAL JOURNAL OF THE PAEDIATRIC ASSOCIATION OF NIGERIA

VOLUME 52
NUMBER 2
APRIL - JUNE 2025

ORIGINAL RESEARCH

Nigerian Journal of Paediatrics 2025 (April-June); Volume 52(2): 101-117.
https://dx.doi.org/10.63270/njp.2025.v52.i2.2000013.

A Cross-Sectional Study of Histopathologic Spectrum of Childhood Diseases in a Tertiary Hospital

Adekunle Ayoade A[1], Onigbinde Olaniyan M[2], Ayo-Aderibigbe Olabisi A[1], Rasheed Mumini W[3], Idowu Najeem A[4], Oguntola Saliu A[4]

[1]Department of Morbid Anatomy and Histopathology, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.
[2]Department of Pediatrics, Ladoke Akintola University of Technology, Teaching Hospital, Ogbomoso, Nigeria.
[3]Department of Anatomic Pathology, Federal University, Dutse, Jigawa State, Nigeria.
[4]Department of Surgery, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

Correspondence
Dr Ayoade A Adekunle, Department of Morbid Anatomy and Histopathology, Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso, Nigeria. E-mail: adeayocare@gmail.com; ORCID: https://orcid.org/0000-0002-0362-2441

Abstract

Background: Paediatric lesions requiring histopathological evaluation encompass a wide variety of conditions, ranging from developmental or congenital anomalies to acquired disorders such as inflammatory and neoplastic diseases.

Objectives: To describe the histopathologic profile of paediatric diseases in specimens submitted for diagnosis at the Department of Morbid Anatomy and Histopathology, LAUTECH Teaching Hospital, Ogbomoso, Nigeria.

Methods: We conducted a retrospective review of all paediatric specimens received in the department over 11 years (January 2012 to December 2022). Clinical data, including patient demographics and histologic diagnoses, were extracted from departmental records for statistical analysis.

Results: A total of 406 paediatric specimens were analysed, comprising 223 (54.9%) females and 183 (45.1%) males. The ages ranged from 31 days to 18 years, with a mean of 11.12 ±5.6 years. By organ system, gastrointestinal lesions were the most frequent (28.8%), followed by lymphoreticular lesions (20.2%). Urological lesions were the least common (3.2%). Histologically, inflammatory lesions predominated (49.3%), followed by benign neoplasms (30.3%) and congenital anomalies (8.4%). Reactive lymphoid hyperplasia was the most common diagnosis across all age groups (16.3%), followed by appendicitis (15.5%), fibroadenoma (12.1%), and hypoganglionosis/aganglionosis (5.2%).

Conclusion: This study highlights the spectrum of paediatric diseases diagnosed via histopathology in this setting, with inflammatory and benign neoplastic lesions being the most prevalent. The findings provide valuable insights for clinical and pathologic practice.

Keywords: Biopsy specimens, Childhood, Histopathologic profile, Nigeria, Reactive lymphoid hyperplasia.

Introduction

The spectrum and pathology of lesions encountered in children differ significantly from those in adults, both in clinical management and natural history, posing unique diagnostic challenges for pathologists.[1,2] These challenges are further compounded in developing nations, where inadequate resources and infrastructure for paediatric pathology services hinder accurate diagnosis and treatment.[1,2] Paediatric surgical lesions are influenced by a multitude of factors, including geographical location, environmental exposures, and socioeconomic conditions, resulting in a diverse range of pathologies—from congenital and developmental anomalies to acquired inflammatory and neoplastic diseases.[3,4]

Globally, paediatric pathologies exhibit distinct epidemiological patterns, with infectious and congenital conditions predominating in low-resource settings, while malignancies and chronic disorders are increasingly reported in high-income regions.[3,5-7] Despite these variations, histopathology remains a cornerstone for definitive diagnosis, particularly in cases where clinical and radiological findings are inconclusive. However, many congenital and rare acquired lesions requiring histopathological evaluation are underdiagnosed in centres lacking specialised paediatric pathology services, leading to gaps in data and suboptimal patient outcomes.[5,6] A review of existing literature reveals a paucity of comprehensive studies on the histopathologic spectrum of childhood diseases in Nigeria and other developing nations.[2,4] Most published works are limited to isolated case reports or small-scale analyses, with few providing a systematic overview of paediatric diseases based on histopathology specimens.[4,6-10] This gap underscores the need for broader, institution-based studies to establish reliable epidemiological data and improve diagnostic accuracy in resource-constrained settings.

Against this backdrop, this study aimed to describe the histopathologic profile of paediatric diseases in a tertiary hospital in southwestern Nigeria, analysing specimens received over 11 years. By documenting the prevalence, demographic distribution, and pathological characteristics of these lesions, we aimed to provide baseline data that can inform clinical practice, resource allocation, and future research in paediatric pathology.

Methods

Study design

This was a retrospective descriptive study analysing paediatric histopathology specimens received at the Department of Morbid Anatomy and Histopathology, LAUTECH Teaching Hospital, Ogbomoso, Nigeria, from January 2012 to December 2022.

Study population

The study population comprised all histopathologic specimens obtained from paediatric patients (birth to 18 years of age) during the study period. A total of 406 cases met the inclusion criteria and were included in the final analysis. The population represented diverse paediatric age groups and pathological conditions encountered in clinical practice.

Ethical considerations

Ethical approval for this study was obtained from the LAUTECH Teaching Hospital Ethics Review Committee (Protocol Number: LTH/OGB/EC/2023/422). The study strictly adhered to the ethical principles outlined in the Declaration of Helsinki for biomedical research. Patient confidentiality was maintained through the use of coded identifiers, and all data were securely stored on password-protected systems accessible only to the research team.

Data collection

Data were collected from histopathology registers, request forms and duplicate copies of results. For each case, we retrieved the original laboratory request forms, which contained demographic information such as age and sex. The corresponding histopathology reports and original Haematoxylin and & Eosin (H&E) - stained slides were also retrieved. In instances where slides were missing or damaged, new sections were prepared from archived formalin-fixed, paraffin-embedded tissue blocks. All slides were reviewed, and consultant histopathologists confirmed the diagnoses to ensure diagnostic accuracy.

Sample size

The sample size (n = 406) consisted of all eligible paediatric cases received during the 11-year study period. This was a total number of cases meeting the inclusion criteria. There was no formal calculation of the sample size.

Inclusion and exclusion criteria

The study included all histopathology specimens from patients aged birth to 18 years with complete clinical information and available histological material (either slides or tissue blocks). We excluded post-mortem specimens, cases with incomplete clinical data, and those where the original slides or tissue blocks could not be retrieved for review.

Variables and classification

Cases were analysed based on several key variables. Patients were stratified into four age groups: infancy (≤1 year), toddler/preschool (1-5 years), school age (5-12 years), and teen (13-18 years). Pathological lesions were categorised as developmental/congenital conditions, inflammatory lesions, traumatic injuries, benign tumours/tumour-like conditions, or malignant neoplasms. Additionally, all specimens were classified according to their organ system.

Data analysis

Data analysis was conducted using Microsoft Excel and SPSS version 23.0 (IBM). Descriptive statistics, including means, standard deviations, and frequency distributions, were calculated for both continuous and categorical variables. The Chi-Square test was used to examine associations between categorical variables, with statistical significance set at $p<0.05$. The findings were presented using tables and charts for clear visualisation.

Results

Demographic characteristics

The study analysed 406 paediatric histopathology specimens processed over 11 years; they comprised 223 females (54.9%) and 183 males (45.1%) (Table I). The age distribution revealed teens (13-18 years) as the largest group (50.0%, n = 203), followed by school-age children (27.3%, n = 111), pre-schoolers (18.5%, n = 75), and infants (4.2%, n = 17) as shown in Table I and Figure 1). The mean age was 11.12 ± 5.6 years, with a range from 31 days to 18 years.

Organ system distribution

Analysis by organ system demonstrated distinct age-related patterns. Gastrointestinal lesions (28.8%, n = 117) predominated overall, being most frequent in school-age children (41.0%, n = 48/117) and also representing the majority of infant cases (52.9%, n = 9/17) (Figure 2 and Table I). Lymphoreticular lesions (20.2%, n = 82) showed a peak prevalence in pre-schoolers (42.7%, n = 35/82), contrasting with breast lesions, which occurred almost exclusively in teenagers (94.7%, n = 54/57). Urological lesions were least common (3.2%, n=13) across all age groups (Table I). Gender variations were notable, with female predominance in breast (98.2%) and reproductive (80.0%) lesions, while males showed higher frequencies in urological (76.9%)

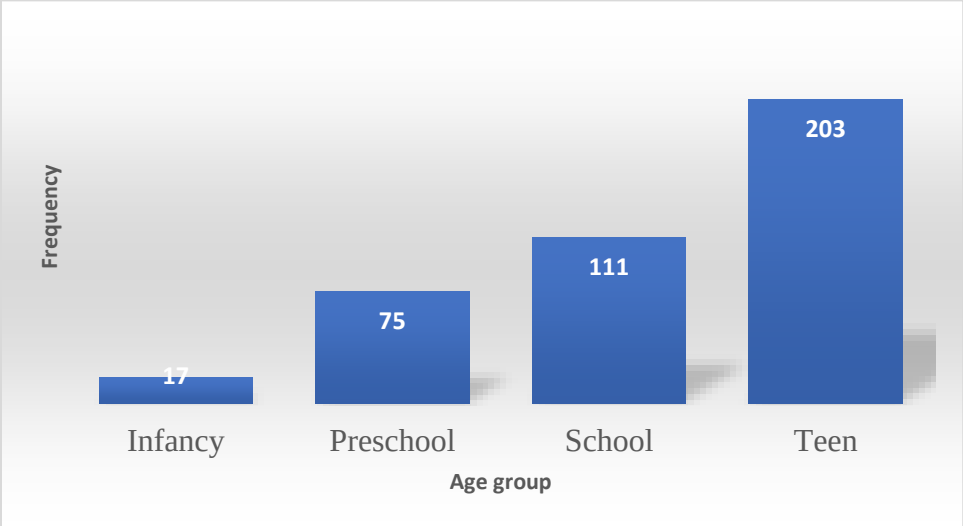
and gastrointestinal (57.3%) specimens (p<0.001) (Table II).

Aetiological categories

Aetiological categorisation revealed that inflammatory conditions were the most prevalent (49.3%, n = 200), particularly among teenagers (43.0%, n = 86/200) and school-age children (32.5%, n = 65/200) (Figure 3 and Table I). Benign neoplasms (30.3%, n =123) showed similar age clustering (69.9% in teens), whereas congenital anomalies (8.4%, n = 34) peaked in pre-schoolers (41.2%, n = 14/34) (Table I). Gender disparities were significant, with male predominance in congenital (64.7%) and malignant (65.2%) lesions contrasting with female predominance in benign neoplasms (74.0%, p<0.001) as shown in (Table II).

Histological diagnoses

Histological diagnosis patterns revealed reactive lymphoid hyperplasia as the most common lesion type (16.3%, n = 66), particularly in pre-schoolers (50.0%, n = 33/66) (Tables III and IV). Appendicitis (15.5%, n = 63) exhibited bimodal peaks in the school-age (41.3%, n = 26) and adolescent (55.6%, n = 35) groups. Fibroadenomas (12.1%, n = 49) occurred exclusively in females, with 95.9% (n = 47) presenting in teen years. Hypoganglionosis/aganglionosis (5.2%, n = 21) exhibited both age-specific (47.6% in pre-schoolers) and gender-specific (3.2:1 male predominance) patterns. Malignant lesions, although uncommon (5.7%, n = 23), showed a gender variation, with lymphoma demonstrating a 4:1 male predominance (p<0.001 for both age and gender associations) (Table IV).



.

Figure 1: Age group of patients with histopathological lesions

Discussion

Our study demonstrated the age stratification of paediatric lesions in our centre. The age distribution patterns we observed aligned with established knowledge about developmental pathology.[3] The predominance of congenital conditions in younger children and neoplastic processes in teens follows expected biological patterns, as demonstrated in similar studies by Shah *et al.* and Bijjaragi *et al.* [4,6] This age-related disease distribution supports the concept that paediatric diseases often manifest within specific

developmental windows, corresponding to critical periods of organogenesis, immune system maturation, and hormonal changes.[3] For example, congenital anomalies typically arise due to disruptions in embryological development, whereas malignancies in adolescents often stem from rapid cellular proliferation and genetic mutations occurring during growth spurts.[3]

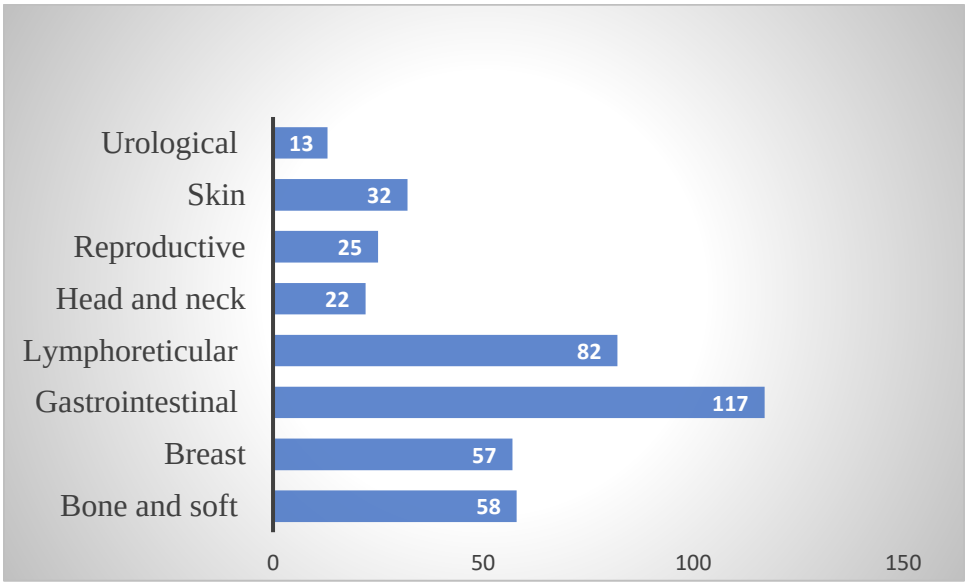


Figure 2: Organ system distribution of patients with histopathological lesions

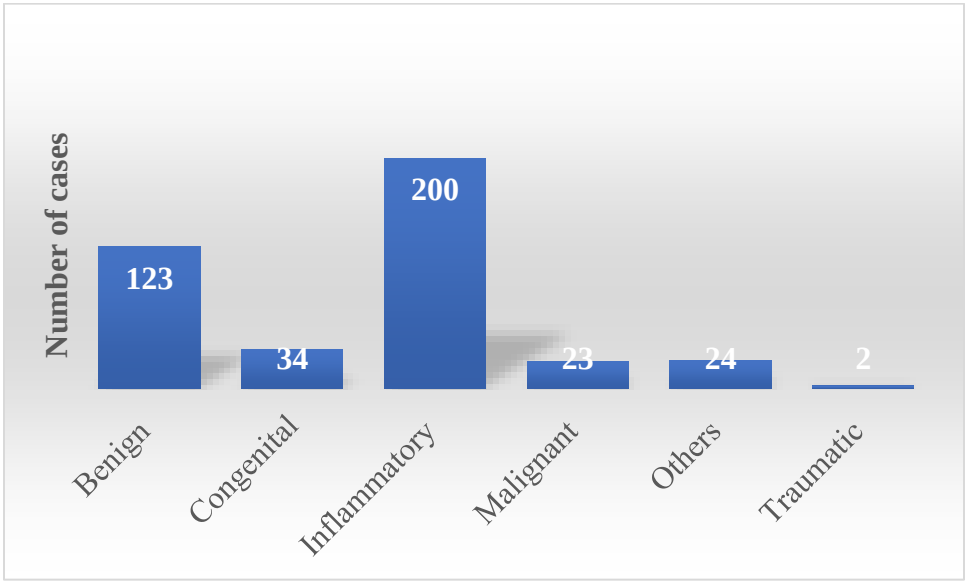


Figure 3: Bar chart showing the aetiological distribution of patients with histopathological lesions

Furthermore, the findings regarding the female predominance in paediatric pathology specimens present an interesting contrast to previous studies, which have reported a more balanced or male-predominant distribution.[4,6] This observed difference suggests potential geographical,

genetic, or environmental influences that shape disease patterns across different paediatric populations.[3,11-15] One possible explanation could be variations in healthcare-seeking behaviour, where cultural or socioeconomic factors influence which children are brought to medical attention.[14,15] Further investigations, including multi-centre studies with larger sample sizes, are needed to clarify whether these variations are due to intrinsic biological factors, healthcare access disparities, or environmental influences.

Table I: Age distribution of paediatric lesions according to organ system and aetiological categories

	Infancy	Preschool	School	Teen	Total
Organ system categories					
Bone and soft tissue	2 (3.4)	10 (17.2)	15 (25.9)	31 (53.4)	58 (100)
Breast	0 (0.0)	1 (1.8)	2 (3.5)	54 (94.7)	57 (100)
Gastrointestinal	9 (7.7)	15 (12.8)	48 (41.0)	45 (35.8)	117 (100)
Lymphoreticular	4 (4.9)	35 (42.7)	23 (28.0)	20 (24.4)	82 (100)
Head and neck	0 (0.0)	4 (18.2)	5 (22.7)	13 (59.1)	22 (100)
Reproductive	1 (4.0)	3 (12.0)	3 (12.0)	18 (72.0)	25 (100)
Skin	0 (0.0)	4 (12.5)	10 (31.3)	18 (56.3)	32 (100)
Urological	1 (7.7)	3 (23.1)	5 (38.5)	4 (30.8)	13 (100)
p<0.001					
Aetiological categories					
Benign	1 (0.8)	13 (10.6)	23 (18.7)	86 (69.9)	123 (30.3)
Congenital	4 (11.8)	14 (41.2)	10 (29.4)	6 (17.6)	34 (8.4)
Inflammatory	6 (3.0)	43 (21.5)	65 (32.5)	86 (43.0)	200 (49.3)
Malignant	2 (8.7)	2 (8.7)	5 (21.7)	14 (60.9)	23 (5.7)
Others	4 (16.7)	3 (12.5)	6 (25.0)	11 (45.8)	24 (5.9)
Traumatic	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	2 (0.5)
p<0.001					
Total	17 (4.2)	75 (18.5)	111 (27.3)	203 (50.0)	406 (100.0)

The gastrointestinal tract was the most commonly affected organ in our study, reflecting its vulnerability to a broad spectrum of congenital, inflammatory, infectious, and neoplastic conditions in children.[16] Gastrointestinal lesions accounted for the majority of cases among infants and school-age children, consistent with the findings of Bijjaragi *et al.*, who reported that the gastrointestinal tract was the most commonly affected organ system in paediatric pathology, encompassing both congenital anomalies and acquired diseases.[6] Ajao *et al.* also reported similar findings, further underscoring the significance of gastrointestinal pathology in paediatric populations.[7]

Among the congenital lesions observed in this study, Hirschsprung's disease was particularly notable. This condition, characterised by the absence of enteric ganglion cells in the distal bowel, leads to functional obstruction and severe constipation. Hypoganglionosis/aganglionosis was the most common congenital lesion observed in males, with a male-to-female ratio of 3.2:1. The majority of affected patients were toddlers, highlighting the early age of presentation of these disorders.

Table II: Gender distribution of paediatric lesions according to organ system and aetiological categories

	Female	Male	Total	p-value
Organ system				<0.001
Bone and soft	25 (43.1)	33 (56.9)	58 (100.0)	
Breast	56 (98.2)	1 (1.8)	57 (100.0)	
Gastrointestinal	50 (42.7)	67 (57.3)	117 (100.0)	
Lymphoreticular	41 (50.0)	41 (50.0)	82 (100.0)	
Head and neck	11 (50.0)	11 (50.0)	22 (100.0)	
Reproductive	20 (80.0)	5 (20.0)	25 (100.0)	
Skin	17 (53.1)	15 (46.9)	32 (100.0)	
Urological	3 (23.1)	10 (76.9)	13 (100.0)	
Aetiological group				<0.001
Benign	91 (74.0)	32 (36.0)	123 (100.0)	
Congenital	12 (35.3)	22 (64.7)	34 (100.0)	
Inflammatory	95 (47.5)	105 (52.5)	200 (100.0)	
Malignant	8 (34.8)	15 (65.2)	23 (100.0)	
Others	16 (66.7)	8 (33.3)	24 (100.0)	
Traumatic	1 (50.0)	1 (50.0))	2 (100.0)	
Total	223 (54.9)	183 (45.1)	406 (100.0)	

Hirschsprung's disease, a severe form of aganglionosis characterised by the absence of ganglion cells in the myenteric and submucosal plexuses, is more common in males, a finding consistent with global patterns.[11] Bijjaragi *et al.* and Shah *et al.* reported male-to-female ratios of 6:1 and 4:3, respectively, reinforcing the well-documented male predominance of this condition.[4,6] Western literature reports an even higher male-to-female ratio of 4:1, suggesting that genetic and environmental factors may influence disease prevalence and severity.[16,17] The variation in male predominance observed across studies may reflect differences in genetic susceptibility among ethnic groups or variations in referral and diagnostic practices.[16,17]

Appendicitis was the most common acute surgical condition affecting school age and teens in our study, with a slight male predominance. This finding aligns with the well-established epidemiology of appendicitis as a leading cause of emergency abdominal surgery in children.[7] A review of the literature consistently identified appendicitis as the most frequent surgical emergency in paediatric populations, highlighting its importance in clinical practice.[7,16,18] Our findings, however, differed from those of Bijjaragi *et al.*, who reported that the majority of appendicitis cases occurred in younger children, specifically between the ages of 6 and 10 years, with a higher incidence among males.[6] A similar observation was made by Shah *et al.*, further supporting the notion of age-related variability in the presentation of appendicitis.[4] The discrepancy between the findings in our study and others may be attributed to geographical differences, variations in sample sizes, or healthcare access patterns that influence the timing of diagnosis and surgical intervention.[13-15]

Table IIIa: Gender distribution of histopathological lesions according to organ systems

Organ system	Female	Male	Total (%)
Reproductive			
Decidua	1	0	1 (0.2)
Endometritis	1	0	1 (0.2)
Follicular cyst	2	0	2 (0.5)
Granulosa cell tumour	1	0	1 (0.2)
Haemorrhagic corpus luteum cyst	1	0	1 (0.2)
Metastatic carcinoma	1	0	1 (0.2)
Ovarian torsion	1	0	1 (0.2)
Ovotestes	1	1	2 (0.5)
Product of conception	5	0	5 (1.2)
Schistosomiasis of testis	0	2	2 (0.5)
Serous cystadenoma	1	0	1 (0.2)
Spermatogenic arrest	0	1	1 (0.2)
Teratoma	3	0	3 (0.7)
Tubo-ovarian abscess	1	0	1 (0.2)
Yolk sac tumour	1	1	2 (0.5)
Total	20	5	25 (6.2)
Urological			
Clear renal cell carcinoma	0	1	1 (0.2)
Intratubular neoplasm	0	1	1 (0.2)
Glomerulonephritis	1	5	6 (1.5)
Nephroblastoma	0	2	2 (0.5)
Renal cyst	0	1	1 (0.2)
Ureteropelvic obstruction	1	0	1 (0.2)
Urethral prolapse	1	0	1 (0.2)
Total	3	10	13 (3.2)

Typhoid enteritis, with or without intestinal perforation, demonstrated no gender predilection in our study. All cases occurred in the school-age and teenage years, an age range that coincides with peak susceptibility to typhoid infection due to increased exposure to contaminated food and water. A study conducted in Aba, Nigeria, reported a male-to-female ratio of 2:1, with a predominance of cases occurring between the ages of 6 and 15 years.[10] The epidemiology of paediatric typhoid perforation varies significantly between developed and developing countries. In high-income settings, paediatric typhoid perforation is rare due to effective public health measures, vaccination programs, and access to antibiotics.[7,10,16] However, in developing countries, it remains a life-threatening

complication of typhoid septicaemia in children, often necessitating surgical intervention.[7,10]

Table IIIb: Gender distribution of histopathological lesions according to organ systems

Organ system	Female	Male	Total (%)
Skin			
Chronic granulomatous inflammation	0	1	1 (0.2)
Condyloma acuminatum	1	0	1 (0.2)
Dermatitis	2	2	4 (1.0)
Dermoid cyst	1	1	2 (0.5)
Epidermoid cyst	3	1	4 (1.0)
Erythema centrifugum	1	0	1 (0.2)
Fibroepithelial polyp	0	1	1 (0.2)
Junctional nevus	0	1	1 (0.2)
Keloid	2	0	2 (0.5)
Lepromatous leprosy	1	0	1 (0.2)
Lichenoid dermatitis	0	1	1 (0.2)
Panniculitis	0	1	1 (0.2)
Pityriasis rosea	0	1	1 (0.2)
Pre-auricular sinus with keratinous cysts	0	1	1 (0.2)
Psoriasiform dermatitis	2	0	2 (0.5)
Spongiotic dermatitis	2	2	4 (1.0)
Syringoma	1	0	1 (0.2)
Tuberculosis	0	1	1 (0.2)
Verrucae vulgaris	1	1	2 (0.5)
Total	17	15	32 (7.9)

The persistence of typhoid-related complications in our setting underscores the need for improved sanitation, early diagnosis, and better access to treatment.

Intussusception, a leading cause of acute abdomen in children under five years of age, occurs when a segment of the intestine telescopes into an adjacent segment, leading to obstruction, vascular compromise, and potential ischemic necrosis.[19] This condition requires prompt diagnosis and intervention to prevent serious complications, including intestinal necrosis and perforation.[19] In the present study, six cases (1.2%) of intussusception were identified, with three patients being younger than five years. The male-to-female ratio was 3:2, consistent with previous studies that have reported a higher incidence in males. Our findings align with those of Bhowmick *et al.* and Shan *et al.*, who also documented a male predominance in cases of paediatric intussusception.[4,20] The reasons for this male preponderance remain unclear but may be related to differences in intestinal motility, hormonal influences, or genetic predisposition.[12,13]

Breast lesions were most frequently observed among teens, mirroring the hormonal changes associated with puberty. These disorders ranged from inflammatory conditions to neoplastic lesions. In our series, fibroadenoma was

predominantly seen in adolescent females, aligning with previous studies from Uyo and Benin City.[8,9]

Table IIIc: Gender distribution of histopathological lesions according to organ systems

Organ system	Female	Male	Total (%)
Bone and soft tissue lesions			
Aneurysmal bone cyst	1	0	1 (0.2)
Arthritis	1	1	2 (0.5)
Chronic granulomatous inflammation	0	1	1 (0.2)
Chest wall sinus	1	0	1 (0.2)
Chondromyxoid fibroma	1	0	1 (0.2)
Draining sinus tract	1	0	1 (0.2)
Fibroma of soft tissue	0	1	1 (0.2)
Ganglion cyst	1	1	2 (0.5)
Haemangioma	5	4	9 (2.2)
Inflammatory myofibroblastic tumour	0	1	1 (0.2)
Leg ulcer	0	1	1 (0.2)
Lipoma	1	3	4 (1.0)
Low-grade fibromyxoid sarcoma	0	1	1 (0.2)
Lymphangioma	0	3	3 (0.7)
Malignant peripheral nerve sheath tumour	0	2	2 (0.5)
Neurofibroma	2	3	5 (1.2)
Nodular fasciitis	0	1	1 (0.2)
Ossifying fibroma	0	1	1 (0.2)
Osteoblastoma	0	1	1 (0.2)
Osteochondroma	2	0	2 (0.5)
Osteoma	1	0	1 (0.2)
Osteomyelitis	2	5	7 (1.7)
Osteonecrosis	2	0	2 (0.5)
Osteosarcoma	1	1	2 (0.5)
Rhabdomyosarcoma	2	2	4 (1.0)
Vasculitis	1	0	1 (0.2)
Total	25	33	58 (14.3)

These findings support the role of oestrogen in the growth and development of fibroadenoma during puberty.[9] Fibroadenomas are the most common benign breast tumours in young females, and their increased frequency in teens may be attributed to hormonal fluctuations that stimulate fibroblastic proliferation in the mammary glands.[15]

Lymphoreticular lesions were most commonly observed among toddlers and affected various components of the lymphoreticular system, including the bone marrow, lymph nodes, spleen,

and mucosa-associated lymphoid tissue. In our study, these lesions included hypocellular marrow, splenic rupture, reactive lymphoid hyperplasia, and lymphoma.

Table IIId: Gender distribution of histopathological lesions according to organ systems

Organ system	Female	Male	Total (%)
Breast lesions			
Adenomyoepithelial adenosis	1	0	1 (0.2)
Blunt duct adenosis	1	0	1 (0.2)
Fibroadenoma	49	0	49 (12.1)
Fibrocystic change	2	0	2 (0.5)
Gynaecomastia	0	1	1 (0.2)
Intraductal papilloma	1	0	1 (0.2)
Stromal fibrosis of the breast	1	0	1 (0.2)
Tubular adenoma of breast	1	0	1 (0.2)
Total	56	1	57 (14.0)
Gastrointestinal			
Appendicitis	32	31	63 (15.5)
Chronic granulomatous inflammation	0	1	1 (0.2)
Clear renal cell carcinoma	0	1	1 (0.2)
Enteritis	0	4	4 (1.0)
Gastritis	1	0	1 (0.2)
Haemorrhagic necrosis of intestine	1	2	3 (0.7)
Hypoganglionosis	5	16	21 (5.2)
Heterotopic pancreas	0	1	1 (0.2)
Inflamed hernia	0	1	1 (0.2)
Intussusception	2	3	5 (1.2)
Juvenile polyp	0	1	1 (0.2)
Juvenile polyp with intussusception	1	0	1 (0.2)
Mesenteric cyst	1	0	1 (0.2)
Metastatic carcinoma	1	1	2 (0.5)
Rectal prolapse	1	0	1 (0.2)
Schistosomiasis	1	0	1 (0.2
Typhoid enteritis	4	5	9 (2.2)
Total	50	67	117 (28.8)

Table IIIe: Gender distribution of histopathological lesions according to organ systems

Organ system	Female	Male	Total (%)
Lymphoreticular			
Chronic granulomatous inflammation	2	0	2 (0.5)
Hypocellular	1	2	3 (0.7
Lymphadenitis	0	2	2 (0.5)
Lymphoma	1	4	5 (1.2)
Reactive lymphadenopathy	35	31	66 (16.3)
Splenic rupture/laceration	1	1	2 (0.5)
Tuberculosis	1	1	2 (0.5)
Total	41	41	82 (20.2)
Head and neck			
Aural polyp	0	1	1 (0.2)
Brachial cyst	1	2	3 (0.7)
Chalazion	1	0	1 (0.2)
Chronic granulomatous inflammation	0	2	2 (0.5)
Giant cell granuloma of gingiva	1	0	1 (0.2)
Granulation tissue	1	0	1 (0.2)
Mucocoele of salivary gland	1	1	2 (0.5)
Nasal polyp	3	2	5 (1.2)
Nasolabial Cyst	1	0	1 (0.2)
Papilloma of palate	0	1	1 (0.2)
Pleomorphic adenoma	1	0	1 (0.2)
Radicular cyst	1	0	1 (0.2)
Tonsillitis	0	2	2 (0.5)
Total	11	11	22 (5.4)

Reactive lymphoid hyperplasia was the most frequently diagnosed condition across all age groups, reinforcing its status as a common response to antigenic stimulation in early childhood.[21] Our findings align with those of Mahajan *et al.*, who reported that reactive lymphadenopathy was more prevalent than malignant lymphoid lesions in paediatric populations.[21] This is particularly relevant for preschool-aged children, as normal lymphoid tissue growth peaks during this period, coinciding with increased exposure to pathogens and immune system development.

Additionally, lymphoma was the most common malignant lymphoreticular lesion in the present study, followed by rhabdomyosarcoma, a pattern consistent with global trends identifying lymphoma as the most prevalent childhood malignancy.[5, 21, 22] In our series, lymphoma showed a marked male predominance (ratio 4:1), which contrasts with the findings of Bijjaragi *et*

al., who reported an equal male-to-female ratio.[6] This discrepancy may be due to differences in genetic predisposition, environmental exposures, or sample composition across study populations.[3,23]

Table IV: Age distribution of common histopathologic lesions among children

Histology type	Infancy	Preschool	School	Teen	Total
Reactive lymphadenopathy	4	33	17	12	66
Appendicitis	1	1	26	35	63
Fibroadenoma	0	0	2	47	49
Hypoganglinosis	3	10	7	1	21
Haemangioma	1	1	2	5	9
Typhoid	0	0	7	2	9
Chronic granulomatous inflammation	0	0	1	6	7
Osteomyelitis	0	2	1	4	7
Glomerulonephritis	0	0	3	3	6
Intussusception	4	1	0	0	5
Lymphoma	0	0	1	4	5
Nasal polyp	0	1	0	4	5
Neurofibroma	1	3	1	0	5
Product of conception	0	0	0	5	5
Dermatitis	0	0	1	3	4
Enteritis	1	1	2	0	4
Epidermoid cyst	0	1	1	2	4
Fibrolipoma	0	1	3	0	4
Rhabdomyosarcoma	1	0	2	1	4
Spongiotic dermatitis	0	0	1	3	4
Others	1	20	33	66	286
Total	17	75	111	203	406

Head and neck lesions, ranging from congenital abnormalities to neoplastic conditions, accounted for 5.4% of cases in the present study. This prevalence was notably lower than the rates reported by Bijjaragi *et al*. (26.1%) and Shan *et al.* (14.4%).[4,6] The observed disparity may be attributed to differences in healthcare access and the availability of specialised paediatric surgical and otorhinolaryngological services at our centre. Limited diagnostic and therapeutic resources for paediatric head and neck conditions may result in underreporting or referral bias in our study population. Regarding skin lesions, the most common conditions encountered in teenagers included non-specific dermatitis, epidermoid cysts, and spongiotic dermatitis. A study conducted in Turkey similarly found that non-neoplastic skin lesions were more frequent than neoplastic lesions in paediatric patients.[24] This observation underscores the predominance of inflammatory and infectious dermatologic

conditions over malignancies in young individuals.

Bone and soft tissue lesions were frequently observed in adolescents, with a male predominance. The most common conditions included haemangioma, neurofibroma, fibrolipoma, and rhabdomyosarcoma. The findings in the present study are consistent with those of Amin *et al.*, which identified haemangioma as the most common benign soft tissue tumour in paediatric patients.[5] The higher prevalence of benign tumours over malignant ones aligns with the reports by Reid and Saifuddin, further supporting the notion that most paediatric soft tissue masses are benign.[25]

Reproductive organ pathologies were predominantly observed among female teens, reflecting the unique gynaecological challenges in this age group. The most frequently encountered pathology was infected products of conception, underscoring the danger of teen pregnancy and its associated complications in our setting.[26,27] This finding highlights the need for improved reproductive health education to reduce unintended pregnancies among teens.

Congenital anomalies such as ovotestis, a disorder of sex development, were identified in both phenotypic males and females. Ovotestis is a rare condition characterised by the presence of both ovarian and testicular tissue, often requiring genetic, hormonal, and surgical evaluation for proper management.[28] Among neoplastic conditions, teratoma was the most frequently observed ovarian tumour, followed by yolk sac tumour, serous cystadenoma, and granulosa cell tumour. These findings align with the findings in studies demonstrating that ovarian tumours are the most prevalent gynaecological neoplasms in paediatric populations.[29,30] The predominance of germ cell tumours such as teratomas and yolk sac tumours is consistent with global trends, as these tumours arise from pluripotent cells and are commonly diagnosed in children.[29-31] Urological lesions demonstrated a clear male predominance, consistent with the findings of some studies.[32,33] The most commonly encountered urological conditions in our study were glomerulonephritis and nephroblastoma, each presenting unique epidemiological patterns.

Glomerulonephritis, an inflammatory disorder affecting the renal glomeruli, was more prevalent in males and older children in our cohort. This contrasts with reports from other studies indicating a female predominance.[34,35] This suggests possible regional variations in disease presentation, genetic predisposition, or environmental influences.[35] Nephroblastoma (Wilms tumour), the most common paediatric renal malignancy, was observed exclusively in males in the present study. This aligns with Illade's findings, which reported a male predominance and a mean presentation age of 2.5 years.[36] Wilms tumour is a highly treatable malignancy with a favourable prognosis when detected early, emphasising the need for timely clinical evaluation of abdominal masses in children.[37] The male-exclusive occurrence in our study, while uncommon, may reflect a sample-size effect or regional epidemiological patterns warranting further investigation.

Strengths and Limitations

This study is one of the most comprehensive paediatric pathology reviews from Nigeria, with the systematic classification into four developmental age groups (infants to teens) revealing important age-specific disease patterns that are infrequently documented in similar low-resource settings. Furthermore, the inclusion of specimens from various organ systems provides a holistic perspective on the distribution of paediatric surgical pathology However, as a single-centre study from a tertiary referral hospital, the findings may reflect institutional

case selection biases rather than true population prevalence.

Conclusion

This study provides valuable epidemiological data on paediatric surgical pathology in a tertiary hospital setting, establishing critical baseline frequencies for various lesions across different age groups. The findings reveal distinct patterns of disease distribution, with gastrointestinal, lymphoreticular, and breast pathologies representing the most commonly encountered conditions. Our age-stratified analysis reveals that pathological manifestations vary significantly across developmental stages, ranging from congenital anomalies in infants to inflammatory and neoplastic conditions in older children. These results offer crucial insights for healthcare resource allocation and service planning at institutional, regional, and national levels. This documented spectrum of paediatric pathology serves as a reference point for future comparative studies and highlights the need for specialised paediatric pathology services in similar healthcare environments.[38,39]

Future directions

To build on this study, future multi-centre, collaborative studies across Nigeria's geographical regions would help establish more representative national benchmarks. The development of digital pathology archives and disease-specific registries for conditions such as Hirschsprung's disease and paediatric lymphomas would significantly enhance epidemiological monitoring and facilitate inter-institutional research collaborations. This also catalyses the promotion and development of paediatric pathology as a subspecialty in anatomical pathology at the national level.[2, 38, 39]

Authors' Contributions: AAA conceptualised and designed the study and drafted the manuscript. OOM, AO, RMW, and INA did data analysis and revised the manuscript. OSA participated in the revision of the draft for sound intellectual content. All authors approved the final version of the manuscript.

Conflicts of interest: The authors declared no conflicts of interest.

Financial support: The authors received no financial support for this research or the preparation of the manuscript.

Accepted for publication: 16th May 2025.

References

1. Peres LC. Paediatric pathology: a work in progress. *Autops Case Rep* 2014;4(4):1-3. https://doi.org/10.4322/acr.2014.032
2. Kerr DA, Kaschula RO. Paediatric pathology services in Africa. *Arch Pathol Lab Med* 2013;137(6):767-74. https://doi.org/10.5858/arpa.2011-0588-RA
3. Maitra A. Diseases of infancy and childhood. In: Kumar V, Abbas KA, Aster JC (Editors). Robbins and Cotran Pathologic Basis of Disease. 9th Ed. Elsevier. 2015. p. 452-81.
4. Shah N, Shah A, Kamdar J, Shah J. Paediatric surgical pathology: a profile of cases from Western India and review of literature. *J Clin Diagn Res* 2015;9(1):08-11.
5. Amin SM, Nwatah VE, Ameh EA, Oyesegun AR, Oyesakin AB. Histopathologic spectrum of childhood tumours in a tertiary hospital: a ten-year review. *Afr Health Sci* 2021;21(1):54-9. https://doi.org/10.4314/ahs.v21i1.9
6. Bijjaragi S, Borah P, Puvvala O. Histomorphological spectrum of paediatric surgical lesions: Experience at a tertiary care centre. *Indian J Pathol Oncol* 2016;3(3):397-403.
7. Ajao AE, Adeniran JO. Spectrum of paediatric surgical cases in a private mission teaching hospital in Nigeria. *Afr J Paediatr Surg* 2022;19:18-22.
8. Nwafor CC, Umeh KU, Etuk EB, Eziagu UB, Kudamnya IJ, Ekwo E. Clinicopathological pattern of breast lesions in children and

adolescents. *Afr Health Sci* 2023;23(3):228-35. https://doi.org/10.4314/ahs.v23i3.28

9. Olu-Eddo AN, Ugiagbe EE. Breast masses in children and adolescents: what is the burden of breast cancer? *Ann Biomed Sci* 2012;11:8-12.
10. Ekpemo SC, Eleweke N. Childhood typhoid intestinal perforation in Aba, Nigeria. *Am J Pediatr* 2018;4(4):110-3. https://doi.org/10.11648/j.ajp.20180404.17
11. Muenchhoff M, Goulder PJ. Sex differences in paediatric infectious diseases. *J Infect Dis* 2014;209(Suppl 3): S120-6. https://doi.org/10.1093/infdis/jiu232
12. Piccini P, Montagnani C, de Martino M. Gender disparity in paediatrics: A review of the current literature. *Ital J Pediatr* 2018;44(1):1. https://doi.org/10.1186/s13052-017-0437-x
13. Del Principe D, Marconi M, Matarrese P, Villani A, Malorni W. Gender disparity in paediatric diseases. *Curr Mol Med* 2013;13(4):499-513. https://doi.org/10.2174/1566524011313040004
14. Wallerich L, Fillol A, Rivadeneyra A, Vandentorren S, Wittwer J, Cambon L. Environment and child well-being: a scoping review of reviews to guide policies. *Health Promot Perspect* 2023;13(3):168-82. https://doi.org/10.34172/hpp.2023.20
15. Spencer N. The social determinants of child health. *Paediatr Child Health* 2018;28(3):138-43. https://doi.org/10.1016/j.paed.2018.01.001
16. Tao DHJ, Vadgama B. Paediatric gastrointestinal pathology: Selected topics. *Diagn Histopathol* 2019;25(9):333-40.
17. Moore SW. Hirschsprung disease: Current perspectives. *Open Access Surg* 2016;9:39-50.
18. Javanmard F, Hasanzadegan Sadegh Y. Pathological assessment of the appendix in appendectomies performed in children. *Arch Iran Med* 2024;27(5):265-71. https://doi.org/10.34172/aim.2024.38
19. Clark AD, Hasso-Agopsowicz M, Kraus MW, Stockdale LK, Sanderson CFB, Parashar UD, *et al.* Update on the global epidemiology of intussusception: a systematic review of incidence rates, age distributions and case-fatality ratios among children aged <5 years, before the introduction of rotavirus vaccination. *Int J Epidemiol* 2019;48(4):1316-26. https://doi.org/10.1093/ije/dyz028
20. Bhowmick K, Kang G, Bose A, Chacko J, Boudville I, Datta SK, *et al.* Retrospective surveillance for intussusception in children aged less than five years in a South Indian tertiary-care hospital. *J Health Popul Nutr* 2009;27:660-5.
21. Mahajan R, Singal P, Kundal S, Singh H, Kundal RK, Monga P. Clinico-cytological and histopathological correlation of lymphadenopathy in paediatric patients. *Asian J Pharm Clin Res* 2022;15(3):156-60.
22. Utuk EO, Ikpeme EE. Childhood cancers in a referral hospital in South-South Nigeria: a review of the spectrum and outcome of treatment. *Pan Afr Med J* 2015;22:325. https://doi.org/10.11604/pamj.2015.22.325.6990
23. Nezelof C, Seemayer TA, Bridge JA. Contributions of paediatrics and paediatric pathology to the body of knowledge regarding human disease. Hum Pathol 2010;41(3):309-15. https://doi.org/10.1016/j.humpath.2009.06.017
24. Calim-Gurbuz B, Pehlivanoglu B, Soylemez-Akkurt T, Erdem O, Ahmedov A. Skin lesions in children: evaluation of clinicopathological findings. Turk Patoloji Derg 2023;39(3):192-8. https://doi.org/10.5146/tjpath.2023.01599
25. Reid C, Saifuddin A. A review of paediatric soft tissue masses referred to a tertiary musculoskeletal sarcoma centre. *Br J Radiol* 2021;94(1117):20200790. https://doi.org/10.1259/bjr.20200790
26. Hertweck P, Yoost J. Common problems in paediatric and adolescent gynaecology. *Expert Rev Obstet Gynecol* 2010;5(3):311-28.
27. Bankole A, Adewole IF, Hussain R, Awolude O, Singh S, Akinyemi JO. The incidence of abortion in Nigeria. *Int Perspect Sex Reprod*

Health 2015;41(4):170–81. https://doi.org/10.1363/4117015.

28. Meenal B, Meenakshi G, Pratibha S, Garima Y, Priyanka K, Poonam E. 46 XY ovotesticular disorder: a rare case report with review of the literature. *Gynecol Minim Invasive Ther* 2021;10(3):171-3. https://doi.org/10.4103/GMIT.GMIT_107_19
29. Xac MC, Jetelina KK, Jarin J, Wilson E. Benign, borderline, and malignant paediatric adnexal masses: A 10-Year Review. J Paediatr Adolesc Gynecol. 2021 Aug;34(4):454-461. doi: 10.1016/j.jpag.2021.01.002. Epub 2021 14th January. PMID: 33453397.
30. Costa J, Alves S, Silva F, Leite F, Bartosch C. Gynecologic adnexal tumours and tumour-like lesions in children and adolescents: experience at a cancer centre. *Int J Surg Pathol*. 2024;32(8):1459–69. https://doi.org/10.1177/10668969241232698
31. Wohlmuth C, Wohlmuth-Wieser I. Gynecologic malignancies in children and adolescents: how common is the uncommon? *J Clin Med* 2021;10(4):722. https://doi.org/10.3390/jcm10040722
32. Ouédraogo I, Tapsoba TW, Zaré C, Bandré E, Bernadette B, Ouédraogo SF, Wandaogo A. Urologic pathologies of children at Ouagadougou. *Open J Urol* 2015;5:172-7. https://doi.org/10.4236/oju.2015.59027
33. Jarzembowski Paediatric renal and genitourinary tract tumors and the contributions of Dr. Louis "Pepper" Dehner therewith. *Semin Diagn Pathol* 2016;33(6):419-26. https://doi.org/10.1053/j.semdp.2016.08.005
34. Moorani KN, Sherali AR. Histopathological pattern in childhood glomerulonephritis. *J Pak Med Assoc* 2010;60(12):1006-9.
35. Maruf-ul-Quader M, Deb KP, Barua SK, Kayes I, Muhuri BR, Mahmud NU, *et al.* Pattern of histopathology of glomerulonephritis in the department of paediatric nephrology of a tertiary care hospital: an experience of four years. *Paediatr Neph J Bang* 2018;3(1):3-8.
36. Illade L, Hernandez-Marques C, Cormenzana M, Lassaletta A, Andión-Catalán M, Ruano D, *et al*. Tumor de Wilms: revisión de nuestra experiencia en los últimos 15 años. *An Paediatr (Barc)* 2018;88:140-9. https://doi.org/10.1016/j.anpedi.2017.03.019
37. Ekpemo S, Eleweke N. Childhood Wilm's tumour in Aba, South East Nigeria. *Ibom Med J* 2024;17(2):292-4. https://doi.org/10.6138/imj.v7i2.438
38. Anaaansen I. Paediatric pathology: Understanding childhood diseases and their implications. *J Med Surg Pathol* 2024;9(2):300. https://doi.org/10.35248/2472-4971.24.9.300
39. Wu H. The essential role of paediatric pathology in children's healthcare. *J Mol Pathophysiol* 2023;12(5):1-2.