Original Article

An Analysis of Paediatric Head-and-Neck Cancers in Northwest Nigeria: A Decade-long Review of Demographics, Cancer Types, Treatment Modalities and Outcomes

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Abstract

Background: Paediatric cancers, notably those in the head-and-neck region, have been increasingly documented as a significant health issue in developing countries. While these malignancies have seen declining mortality rates in developed regions such as the United States and Iran, their impact remains severe in low- and middle-income countries, where resource allocation and health service planning for these cases are essential. This study aimed to elucidate the distribution and outcomes of paediatric head-and-neck cancers within a developing country's tertiary care setting, providing novel insights to guide future policies and interventions. **Methodology:** A retrospective review was conducted of 133 paediatric patients treated for head-and-neck cancers at a tertiary hospital in northwest Nigeria from January 2010 to December 2019. Outcomes were assessed based on the patients' responses to various treatment methods and their presentation timelines post-symptom onset. **Results:** The patients, aged from 2 months to 15 years, presented a variety of head-and-neck tumours, with retinoblastoma (36.1%) and Burkitt's lymphoma (19.5%) being the most common. Multiple treatment methods were applied, and treatment adherence varied significantly. Despite the array of treatments, only 8.3% achieved remission, whereas 39.1% died during treatment, and 27.8% defaulted. Alarmingly, more than half of the patients presented to the hospital late, with only 19.5% seeking treatment within 6 weeks of symptom onset. **Conclusions:** This study reveals stark realities about the severe mortality rates, high incidence of treatment abandonment and late hospital presentation among children with head-and-neck cancers in northwest Nigeria. These findings underscore the urgent need for targeted interventions to enhance early diagnosis, improve treatment adherence and ultimately, increase survival rates. These interventions are crucial to achieving the Global Initiative on Childhood Cancer targets and must be prioritised in resource-limited settings.

Keywords: Late presentation, paediatric head-and-neck cancers, treatment outcomes, Northwest Nigeria

Introduction

Cancer continues to be a significant global health issue, with an estimated 12.7 million new cases and 7.6 million deaths annually.[1] A major share of this burden falls on low- and middle-income countries (LMICs), where low-income populations account for the majority of new cases and deaths.[2-4] A striking disparity exists between developed countries and LMICs when it comes to diagnosing and treating childhood cancers. Around 650,000 children are diagnosed with cancer annually; however, only about 20%–30% of these patients, primarily from high-income countries, receive adequate diagnosis and treatment.[1,3,5] Although survival rates have improved in developed countries due to advancements in paediatric oncology, a significant gap remains in the

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diagnosis and treatment of childhood cancers in LMICs. The impact of these advancements can be seen in the United States, where children diagnosed with cancer now have a high likelihood of recovery.[1,5] On the contrary, cure rates in the LMICs, particularly in sub-Saharan Africa, remain low, with only about 25% of children surviving cancer.[4]

Childhood cancers, compared to many adult cancers, tend to have a better prognosis and survival rate, making them largely treatable.[5] Nevertheless, in LMICs like Nigeria, high childhood cancer mortality rates persist, attributed to factors such as low community awareness, delayed detection, inadequate diagnostic capability, high cost of diagnosis and treatment and lack of accessible specialist care.[6,7]

The importance of early detection in paediatric cancers is critical. Due to often ambiguous symptoms, a global effort has been made to increase public awareness, encouraging parents to seek early medical attention. However, these efforts may prove insufficient if not complemented by prompt and effective detection, diagnosis and treatment measures.[2]

Recent research indicates that delayed presentation of paediatric cancer in Nigeria is a recurring issue influenced by caregiver decisions and various factors. Existing research has extensively investigated the role of demographic factors such as age, gender, socioeconomic status, education level and cultural beliefs in delayed diagnosis. [6,7] However, health sector factors contributing to late detection, misdiagnosis, missed diagnoses and delayed referrals to specialised care have received comparatively less attention. This gap in understanding calls for further investigation to enhance cancer care in LMICs.[2,3]

Methodology

This retrospective descriptive study focuses on the review of medical records from paediatric patients treated for head-and-neck tumours at a tertiary hospital in northwest Nigeria. The review includes records from January 2010 to December 2019. We included patients under 15 years of age who received a final histopathological diagnosis of a head-and-neck tumour. We excluded records that did not have an exact histological diagnosis, those pertaining to proliferative lesions of inflammatory or allergic origin such as adenoid and nose polyp, tumour-like lesions and records of congenital/developmental malformation or cystic lesions.

Data were systematically extracted from these records using a custom-designed form, which captured demographic information, tumour type and location, biological behaviour of the tumour (benign or malignant) and tissue origin of the tumour (epithelial or mesenchymal). The treatment protocols and corresponding outcomes were also recorded. Treatment outcomes were categorized follows: 'defaulted' if the patient did not return for scheduled treatment for more than 4 weeks; Discharged against medical advice' if the patient left the hospital against medical advice; 'remission' when a patient completed treatment and was in follow-up for tumour surveillance; 'discharged' if the patient completed treatment and no further follow-up visits were required. If the death occurred and was recorded in the hospital, patients were classified as 'deceased', whereas those transferring care to another facility were classified as 'referred'.

For data analysis, we used the Statistical Package for the Social Sciences version 25 (IBM, USA 2017). Descriptive statistics were utilised to summarise the data (mean and standard deviations), whereas the Chi-square test was used to evaluate the relationship between the tumour behaviour and variables such as age, gender, tissue of origin and selected treatment outcomes

Results

Our study involving 133 paediatric patients treated for head-and-neck cancers in a tertiary hospital in northwest Nigeria, from 2010 to 2019, produced intriguing results [Table 1]. The majority of patients were aged between 6 and 10 years (45.9%), with a smaller proportion aged 11–15 years (29.3%), and the smallest age group being 0–5 years (24.8%). The mean age across all patients was 7.95 years. Males (58.6%) were overrepresented compared to females (41.4%). The average body mass index (BMI) was 16.68, with a range from 6 to 31 years, and a significant majority of patients (66.2%) were underweight, potentially implicating poor nutrition in cancer incidence and outcomes. Histological diagnoses, as detailed in Table 2, revealed retinoblastoma as the most common cancer type (36.1%), followed by Burkitt's lymphoma (19.5%). Other diagnoses included Hodgkin's lymphoma

Table 1: Demographic and anthropometric measurement body mass index of sampled patients with head-and-neck tumours in the haemato-oncology clinic in the hospital (*n*=133)

Variables	Frequency, *n* (%)
Age (years) mean	7.95±3.79
0–5	33 (24.8)
6–10	61 (45.9)
11–15	39 (29.3)
Total	133 (100)
Sex	
Male	78 (58.6)
Female	55 (41.4)
Total	133 (100)
BMI	
Mean (ranging from 6–31)	16.68±4.34
Underweight	88 (66.2)
Normal	40 (30.1)
Overweight	5 (3.8)
Total	133 (100)

BMI: Body mass index

Table 2: Histological diagnosis amongst sampled patients attending the paediatric haemato-oncology clinic of (*n*=133) of patients with head-and-neck tumours in the study

Diagnosis	Frequency, *n* (%)
Retinoblastoma	48 (36.1)
Burkitt's lymphoma	26 (19.5)
Hodgkin's lymphoma	18 (13.5)
Non-Hodgkin's lymphoma	17 (12.8)
Nasopharyngeal tumour	11 (8.2)
Fibrous dysplasia	6 (4.5)
Neuroblastoma	4 (3.0)
Fibroma	1 (0.8)
Fibrosarcoma	1 (0.8)
Teratoma	1 (0.8)
Total	133 (100)

Table 3: Anatomical site of head-and-neck tumours in the study

Site	Frequency, *n* (%)
Neck	35 (26.3)
Eye	32 (24.1)
Jaw	21 (15.8)
Maxilla	19 (14.3)
Face	12 (9.0)
Nasopharynx	11 (8.3)
Mandible	9 (6.8)
Scalp	5 (3.8)
Cervical	5 (3.8)
Abdominal	4 (3.0)
Chest	4 (3.0)
Ear	4 (3.0)
Back	3 (2.2)
Axilla	2 (1.5)
Groin	2 (1.5)
Head	2 (1.5)
Cheek	1 (0.8)
Lip	1 (0.8)
Nose	1 (0.8)
Tongue	1 (0.8)
Testes	1 (0.8)
Scrotum	1 (0.8)
Spine	1 (0.8)

(13.5%), non-Hodgkin's lymphoma (12.8%) and nasopharyngeal tumours (8.2%). This diversity in cancer types emphasizes the need for comprehensive diagnostic and treatment capabilities.

Table 3 offers a comprehensive overview of the anatomical sites of the tumours. The neck was the most frequent site (26.3%), followed by the eye (24.1%), jaw (15.8%) and maxilla (14.3%). The diversity of these sites necessitates a wide range of diagnostic and treatment skills amongst healthcare professionals in the region.

Table 4: Treatment methods modalities administered to the study patients

Treatment	Frequency, *n* (%)
Chemotherapy	66 (49.7)
Chemotherapy/surgery	37 (27.8)
Chemotherapy/surgery/radiotherapy	16 (12.0)
None	14 (10.5)
Total	133 (100

Table 5: Duration of illness and hospital stay

Variables	Frequency, *n* (%)
Duration of illness (weeks)	
Mean (ranging from 0–240)	33.06±44.16
0–6	26 (19.5)
7–12	24 (18.0)
13–18	14 (10.5)
19–24	23 (17.4)
25–30	6 (4.5)
31–36	8 (6.0)
37–42	6 (4.5)
43–52	11 (8.3)
>52	15 (11.3)
Total	133 (100)
Hospital stay	
Mean (ranging from 0–436)	17.82±55.46
0–4	46 (34.6)
5–8	38 (28.6)
9–12	20 (15.0)
13–16	9 (6.8)
17–20	6 (4.5)
>20	14 (10.5)
Total	133 (100)

Regarding treatment modalities, shown in Table 4, chemotherapy was the most commonly used treatment (49.7%), followed by a combination of chemotherapy and surgery (27.8%), and a comprehensive regimen involving chemotherapy, surgery and radiotherapy (12.0%).

Alarmingly, 10.5% of patients received no treatment, emphasizing systemic barriers to healthcare accessibility and adherence.

Table 5 displays the duration of illness and length of hospital stay. The mean duration of illness was around 33 weeks but with substantial variability. Only 19.5% of patients sought treatment within the first 6 weeks of symptom onset, and 11.3% waited more than a year, highlighting a gap in early detection and healthcare access. The mean hospital stay was around 18 weeks, also with considerable variation, and reflects the complexities of managing these paediatric cancers.

The outcomes of the treatments, presented in Table 6, revealed a high mortality rate (39.1%) and a substantial rate of defaulting (27.8%). Only 8.3% of patients achieved remission, further highlighting the severity of paediatric head-and-neck cancers in LMICs and the importance of enhancing healthcare services.

Table 6: Outcomes amongst sampled patients of patients with head-and-neck tumours in the study

Treatment	Frequency, *n* (%)
Discharged	14 (10.5)
Died	52 (39.1)
Defaulted	37 (27.8)
Discharged against medical advice	13 (9.8)
Remission	11 (8.3)
Referred	3 (2.3)
Abscond	3 (2.3)
Total	133 (100)

Table 7: Outcomes and associated factors amongst sampled patients

Variables	χ^2	df	*P*
Remission			
Hospital stay (6 weeks)	8.721*	1	0.003
Age	6.415	3	0.030
Duration of illness (16 weeks)	2.08	1	0.210
Type of malignancy	1.757*	1	0.358
BMI	0.869*	2	0.678
Sex	0.083	1	1.000
Death			
Hospital Stay (6 weeks)	16.755	1	0.001
Type of malignancy	6.961	1	0.004
BMI	4.542*	2	0.080
Sex	1.988	1	0.168
Duration of illness	0.208	1	0.696
Age	0.025	3	1.000
Default			
Age	0.248	3	0.900
BMI	1.139*	2	0.657
Sex	0.009	1	1.000
Duration of illness	0.423	1	0.548
Hospital stay (6 weeks)	0.047	1	0.840
Type of malignancy	1.613*	1	0.244

BMI: Body mass index

Finally, Table 7 presents associations between various factors and patient outcomes. Our results emphasize the need for interventions focused on early diagnosis, improved treatment strategies, better adherence and overcoming systemic healthcare barriers. These data also highlight the importance of policy interventions and resource allocation for enhancing paediatric cancer care in northwest Nigeria and similar settings.

Discussion

Paediatric head-and-neck tumours are rare neoplasms that can occur in children. Several studies have focused on different aspects of these tumours, including their incidence, histological types, treatment and outcomes.

In our investigation involving 133 paediatric patients treated for head-and-neck cancers in a tertiary Hospital in Northwest Nigeria from 2010 to 2019, the results exhibit similarity with global and regional studies as shown in Table 1. A majority of patients aged between 6 and 10 years (45.9%), aligning with Ferlay *et al*.[1] and, Stefan and Siemonsma[8] who found this age range prevalent in paediatric cancers.[1,8] There was a higher prevalence of males (58.6%) than females (41.4%), as reported in similar studies.[5,9]

The mean BMI was 16.68, with 66.2% of the patients underweight, indicating the role of malnutrition in paediatric cancer incidence, comparable to Howard *et al*.[10] Histological diagnoses revealed a high prevalence of retinoblastoma (36.1%), which is consistent with the findings of Agboola *et al*. and Ekenze *et al*. for the region.[11,12,13] Other common diagnoses included Burkitt's lymphoma, Hodgkin's lymphoma, Hodgkin's lymphoma and nasopharyngeal tumours, echoing a similar range of diagnoses as reported by Shojaei *et al*. and Khademi *et al*.[14,15]

The distribution of tumour sites with the neck (26.3%) and the eye (24.1%) being the most common also agrees with previous research.[19,23] The treatment outcomes, presented in Table 4, showed a high mortality rate (39.1%) and a substantial rate of defaulting (27.8%), reflecting the severity of paediatric head-and-neck cancers in LMICs.[16,17,18]

Chemotherapy was the most prevalent treatment modality (49.7%), similar to global trends (Kellie *et al*. and Howard *et al*.)[8,10] However, an alarming 10.5% of patients received no treatment, indicating systemic healthcare barriers that have been described by Faruqui *et al*.[18]

The duration of illness and length of hospital stay mirrored trends in similar contexts, highlighting gaps in early detection and healthcare access.[8] Our study underscores the need for interventions focusing on early diagnosis, improved treatment strategies and better adherence, congruent with the sentiments of Smith *et al*. and Ribeiro *et al*.[2,5] As per our findings, it is paramount to work towards policy interventions and resource allocation for improving paediatric cancer care in northwest Nigeria and similar settings, as suggested by Valsecchi and Steliarova-Foucher and Taylor *et al*.[19,20,21]

To further delve into our findings, Table 7 associates various factors with patient outcomes. The results point to critical areas such as the need for strategies to overcome systemic healthcare barriers, a point also raised by Pakhomov *et al*.[22] Considering the high burden of childhood cancers in low-income settings as emphasized by Howard *et al*. and Akinmoladun *et al*.,[11,23] our data underscore the importance of appropriate resource allocation for enhancing paediatric cancer care in northwest Nigeria.

The striking prevalence of retinoblastoma in our study agrees with the previous report and underlines the need for enhanced ophthalmological services and surveillance in paediatric populations.[10,16] Moreover, the high representation of

Burkitt's lymphoma, Hodgkin's lymphoma and non-Hodgkin's lymphoma is consistent with the study by Shojaei *et al*. and reflects the necessity of specialized oncological services for these specific malignancies.[15]

The diversity of cancer types and anatomical sites reinforces the importance of well-equipped diagnostic facilities, specialised healthcare professionals and comprehensive treatment approaches to handle the spectrum of paediatric head-and-neck cancers, as previously stressed by Khademi *et al*. and Chandrakar and Choudhary.[14,24]

The severity of paediatric head-and-neck cancers is brought to light by the significant mortality rate (39.1%) and the rate of defaulting (27.8%), a sobering reminder of the critical issues plaguing paediatric oncology in LMICs.[6,9] The reliance on chemotherapy as the primary treatment method (49.7%) and the alarming 10.5% of patients who received no treatment reflect systemic healthcare barriers, a finding that echoes the challenges described by Faruqui *et al*.[18]

Conclusion

Our study aligns with the body of literature emphasizing the urgent need for policy interventions, improved resource allocation and strategic efforts focusing on early diagnosis, improved treatment strategies and patient adherence for enhancing paediatric cancer care, particularly in challenging settings like northwest Nigeria.[2,5,12,20]

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Conflicts of interest

There are no conflicts of interest.

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