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# **Original Research Article**

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# Clinico-pathological profile of paediatric head and neck cancers in Tanzania: Findings from the country's largest tertiary hospital

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#### **ABSTRACT**

**Background:** Head and neck cancer is the sixth most common cancer in the world and the largest burden occurs in developing countries where such burden of infectious diseases is also high. Data on the clinico-pathological profile of paediatric head and neck cancers is scarce in Tanzania. To the best of our knowledge, this is the first study in Tanzania to characterize such profile.

**Methods:** A hospital based descriptive cross sectional study was conducted involving 180 pediatric patients at Muhimbili National Hospital. Data collected was analyzed using SPSS program version 21.

**Results:** A total of 180 paediatric patients were recruited where 61.1% were males with a male to female ratio of 1.57:1 and majority fell into the 0-5years age range (53.9%). Ten primary anatomical sites were found with the neck (cervical lymph node) (36.1%) predominating followed by the orbit/eye (34.4%) and the least common site was parapharyngeal space (0.5%). The neck was more affected in patients aged 6-11 years with a diagnosis of lymphomas (98.5%) whereas the orbit was affected predominantly in those aged 0-5 years (90.3%) by retinoblastoma (79%). The predominant histocytopathological variant was lymphoma (52.8%) and the least was Langerhans cell histiocytosis (0.6%). Lymphomas and retinoblastoma occurred commonly in males (70.53% and 53.06% respectively) but sarcomas showed no gender predilection. Lymphomas (32.6%) and retinoblastomas (93.9%) predominated in patients aged 6-11 years and 0-5 years respectively.

**Conclusions:** Lymphomas, retinoblastomas and sarcomas were more predominant in paediatric patients similar to what has been reported in various reports elsewhere.

Keywords: Clinico-pathological, Head, Neck, Cancers, Tanzania

### INTRODUCTION

Head and neck cancers are malignant tumors occurring in the nasal cavities, paranasal sinuses, nasopharynx, oral cavity, oropharynx, hypopharynx, larynx, ear, eye, scalp, orofacial bones, thyroid and salivary glands and they are reported to be the sixth most common cancer globally with associated potential morbidity and mortality. <sup>1,2</sup>

Cancers involving the head and neck are associated with high morbidity and mortality because of their tendency to interfere with vital functions of life such as breathing, swallowing, speech, hearing, vision, taste and smelling.<sup>3,4</sup>

Cancers are relatively rare in children unlike the pattern that is seen in older age groups.<sup>5</sup> Paediatric cancers have been found to be second only to accidental trauma as a

cause of death in children aged 5 to 14 years in developed countries. Contrary to what was observed in the past decades of life where cancers were reported to be rare in paediatric population in developing countries, the trend has now change with studies showing an increasing incidence of head and neck cancers in these countries. Globally there is an estimated number of 650000 new cases worldwide. 4-6

Even though paediatric cancers were once very rare, recent reports suggest that they are becoming a major source of mortality. Children constitute a significant proportion of the population in many developing countries for example about one-third of the general population in developing countries comprises of paediatric population and therefore proper documentation of paediatric malignancies including head and neck cancers is of paramount importance in planning medical services, resource allocation and policy formulation in such countries.<sup>5-8</sup>

Despite the changing trend in terms of causes of paediatric morbidity and mortality, data on the clinico-pathological profile is scarce in Sub Saharan Africa. The objective of this study was to describe the clinico-pathological profile of paediatric head and neck cancers among paediatric patients at Muhimbili National Hospital (MNH) of which it has laid a basis for the limited data in Tanzania and Sub-Saharan Africa thus spearheading the fight against paediatric morbidity and mortality.

#### **METHODS**

#### Study design

This was a descriptive cross-sectional study.

#### Study place

The study was conducted at Muhimbili National Hospital in the following departments (inpatients and outpatients); Department of Otorhinolaryngology, Ophthalmology, Paediatric surgery, Paediatric Oncology, Internal Medicine and also the Department of Oral and Maxillofacial Surgery. Muhimbili National Hospital is the national referral and teaching hospital with 1,500 bed facility attending about 1,000-1,200 outpatients and inpatients per week. From the selected departments the following were the total number of paediatric patients with malignant neoplasms, June (36 patients), July (41patients), August (49 patients), September (34 patients), October (39 patients) and there were only 30 patients in November thus yielding a total of 229 paediatric patients.

# Study population

Patients from birth up to 18 years with histocytopathologically proven head and neck malignant neoplasms at MNH.

#### Study period

The study was conducted for a period of 6 months from June to November 2017.

#### Inclusion criteria

All paediatric patients (from birth up to 18 years) both in patients and outpatients with histocytopathologically proven head and/or neck malignant neoplasms from the selected departments whose parent/care takers consented to participate.

#### Exclusion criteria

Paediatric patients whose parent/care takers were found to be mentally unfit to give consent. Patients with primary intracranial neoplasms were also excluded so as to fit the areas that have been covered from the available literatures where brain tumours (primary intracranial neoplasms) were not regarded as part of head and neck malignant neoplasms in majority of the available literatures.

Cervical lymph nodes having been involved as a metastatic focus such as cervical lymphadenopathy as a manifestation of nasopharyngeal cancer were excluded from being considered to be the primary anatomical sites and in such cases nasopharynx was considered to be the primary anatomical site. Similarly, skin involvement as an extension of head and neck cancers for example skin involvement by sinonasal cancers was not considered to be the primary anatomical site, in such cases the sinonasal region was considered to be the primary anatomical site. In patients with aural cancers involving the skin of the pinna, the ear was considered to be the primary anatomical sites in such patients.

# Data collection techniques

Pretested, structured questionnaires were used to collect data from selected patients who met the inclusion criteria and this was done by the principal investigator. All histocytopathological specimens were processed and analysed by qualified histopathologist or cytologists working at Muhimbili National Hospital.

#### Statistical analysis

Quantitative variables were analyzed using mean, median and percentages. A two-tailed p-value <0.05 was considered significant.

# Ethical approval

Ethical clearance was sought from Research and Publication Committee of the School of Medicine and from Senate Research and Publications Committee of the Muhimbili University of Health and Allied Sciences. Administrative permission to conduct the study was

obtained from Muhimbili National Hospital as per hospital management protocols.

A written informed consent for children's participation in the study was obtained from parent/care taker (s) before enrolment of each child into the study. Subject's confidentiality was fully guaranteed and freedom of each study participant to withdraw from the study at any point in time without penalties was ensured to participants through their caretakers/guardians.

#### **RESULTS**

Among 180 study participants, majority were males 110 (61.1%) (M:F=1.57:1), (p value=0.002) and mean age (years) was 1.64±0.768. Majority of patients 97 (53.9%) were in the age group 0-5 years in both males (43.6%) and females (70%) while least number of patients 32 (17.8%) belonged to the age group 12-17 years. A total of ten primary anatomical sites for paediatric head and neck cancers were found in this study with majority having the neck (cervical nodes) 65 (36.1%) having been involved as the primary site followed by the orbit/eye 62 (34.4%) (Table 1).

Table 1: Distribution of primary anatomical sites for paediatric head and neck cancers.

Anatomical site for primary	Frequency
cancer	N (%)
Orbit/eye	62 (34.4)
Ear	6 (3.3)
Maxilla	19 (26.3)
Maxilla and mandible	3 (1.7)
Skin	7 (3.9)
Neck (cervical node)	65 (36.1)
Sinonasal region	10 (5.6)
Nasopharynx	5 (2.8)
Other sites	3 (1.7)
Total	180 (100)

Table 2 depicts distribution of paediatric head and neck cancers by primary anatomical sites and age of patients and its shows patients aged 0-5 years to have the orbit/eye 56 (90.3%) and other sites (parapharyngeal space and oral cavity) 3 (100%) being predominantly affected and leastly the nasopharynx 1 (20%). Among those aged 12-17 years, nasopharynx was the most affected (80%) site and leastly the neck (cervical nodes) (24.6%) (p value=0.000).

Table 2: Distribution of paediatric head and neck cancers by primary anatomical sites and age of patients.

Anatomical site for primary	Age group (in	Total		
cancer	0-5	6-11	12-17	N (%)
Orbit/eye	56 (90.3)	6 (9.7)	0 (0)	62 (34.4)
Ear	4 (66.7)	2 (33.3)	0 (0)	6 (3.3)
Maxilla	3 (15.8)	11 (57.9)	5(26.3)	19 (10.6)
Maxilla and mandible	0 (0)	1 (33.3)	2 (66.7)	3 (1.7)
Skin	3 (42.86)	2 (28.57)	2 (28.57)	7 (3.89)
Neck (cervical node)	21(32.3)	28 (43.1)	16 (24.6)	65 (36.1)
Sinonasal region	6 (60)	1 (10)	3 (30)	10 (5.6)
Nasopharynx	1 (20)	0 (0)	4 (80)	5 (2.8)
Other sites	3 (100)	0 (0)	0 (0)	3 (1.7)
Total	97 (53.9)	51 (28.3)	32 (17.8)	180 (100)

Table 3: Distribution of primary anatomical sites for paediatric head and neck cancers by sex of patients.

	Sex	Total		
Anatomical site for primary cancer	Male Female		N (%)	
	N (%)	N (%)	14 (78)	
Orbit/eye	34 (54.8)	28 (45.2)	62 (34.4)	
Ear	3 (50)	3 (50)	6 (3.3)	
Maxilla	10 (52.6)	9 (47.4)	19 (26.3)	
Maxilla and mandible	2 (66.7)	1 (33.3)	3 (1.7)	
Skin	3 (42.9)	4 (57.1)	7 (3.9)	
Neck (cervical node)	50 (76.9)	15 (23.1)	65 (36.1)	
Sinonasal region	5 (50)	5 (50)	10 (5.6)	
Nasopharynx	3 (60)	2 (40)	5 (2.8)	
Other sites	0 (0)	3 (100)	3 (1.7)	
Total	110 (61.1)	70 (38.9)	180 (100)	

Table 3 shows males to have the neck (cervical nodes) being more affected 50 (76.9%) followed by the maxilla/mandible 2 (66.7%) and leastly the skin (42.9%). Females had other primary anatomical sites (oral cavity and parapharyngeal space) 3 (100%) predominating and leastly the neck (cervical node) in 23.1% of cases (p value=0.120).

Table 4: Histocytopathological distribution of paediatric head and neck cancers.

Histocytopathological	Frequency			
variant for primary cancer	N (%)			
Olfactory neuroblastoma	2 (1.1)			
Sarcomas	16 (8.9)			
Carcinomas	12 (6.7)			
Lymphomas	95 (52.8)			
Retinoblastoma	49 (27.2)			
Neuroblastoma	5 (2.8)			
Langerhans cell histiocytosis	1 (0.6)			
Total	180 (100)			

Table 4 shows histocytopathological distribution of paediatric head and neck cancers and from the study, the predominant variant was lymphoma (52.8%) followed by retinoblastoma (27.2%) whereas the least ones were olfactory neuroblastoma 2 (1.1%) and Langerhans cell histiocytosis 1 (0.56%).

Table 5 depicts distribution of histocytopathological variants of paediatric head and neck cancers by sex of patients where carcinomas (66.67%) and neuroblastoma (60%) predominantly affected females than males whereas lymphomas (70.53%), retinoblastoma (53.06%), olfactory neuroblastoma (100%), Langerhans cell histiocytosis (100%) predominated in males. However, sarcomas showed no sex predilection (p value=0.142).

Table 6 shows distribution of histocytopathological variants of head and neck cancers by age of patients where retinoblastoma was predominant in the age group of 0-5 years (93.9%) and least in those aged 6-11 years (6.3%) while Hodgkin lymphoma was predominant in the age group of 6-11 years (44%) and least in those aged 12-17 years (26%) (p value is 0.000).

Table 5: Distribution of histocytopathological variants of paediatric head and neck cancers by sex of patients.

	Sex		Total	
Histocytopathological variants	Male	Female	NI (0/ )	
	N (%)	N (%)	N (%)	
Carcinomas	4 (33.33)	8 (66.67)	12 (6.67)	
Sarcomas	8 (50)	8 (50)	16 (8.89)	
Lymphomas	67 (70.53)	28 (29.47)	95 (52.78)	
Olfactory neuroblastoma	2 (100)	0 (0)	2 (1.11)	
Langerhans cell histiocytosis	1 (100)	0 (0)	1 (0.56)	
Retinoblastoma	26 (53.06)	23 (46.94)	49 (27.22)	
Neuroblastoma	2 (40)	3 (60)	5 (2.78)	
Total	110 (61.11)	70 (38.89)	180 (100)	

Table 6: Distribution of histocytopathological variants of head and neck cancers by age of patients.

Histocytopathological	Age of patients (in ye		Total	
variant	0-5	6-11	12-17	N (%)
Retinoblastoma	46 (93.9)	3 (6.3)	0 (0)	49 (27.22)
Hodgkin lymphoma	15 (30)	22 (44)	13 (26)	50 (27.78)
Non Hodgkin lymphoma	16 (35.6)	17 (37.8)	12 (26.7)	45 (25)
Carcinomas	5 (41.7)	2 (16.6)	5 (41.7)	12 (6.67)
Sarcomas	10 (62.5)	6 (37.5)	0 (0)	16 (8.89)
Neuroblastoma	4 (80)	1 (20)	0 (0)	5 (2.78)
Olfactory neuroblastoma	0 (0)	0 (0)	2 (100)	2 (1.11)
Langerhans cell histiocytosis	1 (100)	0 (0)	0 (0)	1 (100)
Total	97 (53.9)	51 (28.3)	32 (17.8)	180 (100)

Table 7 depicts distribution of paediatric head and neck cancers by anatomical sites and histocytopathological diagnosis and from the study; neck (cervical node) was involved mostly by lymphomas (98.5%). The eye was

predominantly affected by retinoblastoma in 79% of cases and the maxilla by lymphomas (Burkitt's lymphoma) in 73.7% of cases.

Table 7: Distribution of paediatric head and neck cancers by anatomical sites and histocytopathological diagnosis.

Anatomical	Histocy	topathologica	l variants					
sites	ONB	Sarcomas	Carcinomas	Lymphoma	RB	NBS	LCH	Total
Sinonasal	1 (10)	5 (50)	2 (20)	2 (20)				10 (5.6)
Nasopharynx	1 (20)		2 (40)	2 (40)				5 (2.8)
Maxilla		4 (21.1)		15 (78.9)				19 (10.6)
Maxilla and				3 (100)				3 (1.7)
mandible				3 (100)				3 (1.7)
Orbit/eye			2 (3.2)	8 (12.9)	49 (79)	3(4.8)		62 (34.4)
Skin		1 (14.28)	5 (71.44)				1 (14.28)	7 (3.89)
Neck				64 (98.5)		1 (1.5)		65 (36.1)
Ear		5 (83.3)		1 (16.7)				6 (3.3)
Other sites		1 (33.3)	1 (33.3)			1(33.3)		3 (1.7)
Total	2 (1.1)	16 (8.9)	12 (6.7)	94 (52.8)	49(27.2)	5 (2.8)	1 (0.6)	180(100)

ONB: Olfactory neuroblastoma; LCH: Langerhans cell histiocytosis; RB: Retinoblastoma; NBS: Neuroblastoma.

From the study, neck (cervical node) was involved mostly by lymphomas (98.5%). The eye was predominantly affected by retinoblastoma in 79% of cases and the maxilla by lymphomas (Burkitt's lymphoma) in 73.7% of cases.

#### **DISCUSSION**

To the best of our knowledge, this is the first study to document the clinico-pathological profile of paediatric head and neck cancers in Tanzania, and thus provide important baseline data with which to compare results with that of other countries and an opportunity to prioritize treatment in terms of paediatric head and neck cancers due to their ability to interfere with vital functions of life such as respiration and deglutition.

Findings in this study depict the same clinicopathological profile as it has been found in several other studies from different parts of the world. Majority of studied participants were in the age group 0-5 years. Males outnumbered females in this study with male to female ratio being 1.6:1 (p value of 0.002) with mean age at encounter being 1.64 $\pm$ 0.8. Such findings correlate with those from Nigeria, Ghana, Iran and India. 9-13

From this study, the commonest affected anatomical site was the cervical node (neck) followed by the orbit and lastly by the parapharyngeal space and oral cavity similar to other studies done elsewhere. <sup>12,14-16</sup> Such similarity may be accounted by an almost similar strata of the studied individuals where the ages correspond epidemiologically to life time incidence of paediatric head and neck cancers.

Other studies from different parts of the world showed findings distinct from those found in this study. Such differences may be attributed by larger population of children under the age of five years in the study which was conducted by Adeyemo in Nigeria which correspond epidemiologically to the life time incidence of retinoblastoma thus showing the orbit/eye to be the predominant anatomical site.<sup>2</sup> The observed difference may also be accounted by different methodologies utilized where cancers outside the head and neck region such as Wilms tumor were included by Sunday et al while these were excluded from this study.<sup>17</sup> Similarly, Samaila-Omatara from Nigeria had included anatomical sites outside the head and neck region such as testis and even primary intracranial neoplasms such as ganglioneuroblastoma and malignant peripheral nerve sheath tumors which were excluded in this study and thus yielding the observed differences.<sup>18</sup>

In this study, the orbit/eye was found to be predominantly affected in children aged 0-5 years and these findings correlate closely to what has been established in several other studies done elsewhere. 9,18-22 Such similarity may be accounted by the known life time incidence of retinoblastoma where it occurs commonly in children under the age of five years. Cervical lymph nodes in this study were affected mostly among those aged >6years whereas the nasopharynx was afflicted in children aged 12-17 years similar to what was done elsewhere. 12,23-25

This study has depicted variability in terms of sex predominance by various by head and neck malignant neoplasms. This study found several sites to be affected predominantly in males similar to what has been found elsewhere where the orbit cervical lymph nodes and nasopharynx had male predominance. <sup>2,12,15,23,26-29</sup> No sex predilection was found in terms of affection of the sinonasal region in this study but a study in Nigeria found male predominance but another from United States of America had female preponderance. Such differences may be accounted by variable epidemiological distribution of head and neck cancers. <sup>2,29</sup>

There has been variability in terms of sex distribution in head and neck malignant neoplasms in paediatric patients. Lymphomas showed male predominance similar to other studies. <sup>15,28</sup> Carcinomas had male predominance

in this study contrary to what has been found in majority of studied literatures which reported male predominance. However a study from India reported female predominance similar to what has been established in this study. 28

This study found no sex predilection in sarcomas contrary to what has been established in other studies with male and female predominance. 15,19,2427,28

Retinoblastoma in this study showed male predominance similar to what has been reported elsewhere. <sup>11</sup> Though one study from Nigeria reported no sex predilection in retinoblastomas. <sup>24</sup> The disparity may be accounted from what is known epidemiologically on male predominance in retinoblastomas.

Majority of the studies have shown lymphoma to be the leading histocytopathological variant followed by retinoblastoma whereas other studies reported lymphoma to be leading followed by either carcinomas or sarcomas or acute leukemias or renal tumors. 11,13-16,18,20,21,23,28 Studies which had sarcomas and leukemias as the second most common variant had such findings because of inclusion of malignant neoplasms outside the head and neck region while these were excluded in this study from MNH. Those two studies by Khademi et al in Iran and Sengupta et al in Iran with carcinomas being the second most common histocytopathological variant excluded orbital cancers whilst these were included in this study.

Retinoblastoma in this study showed male predominance similar to what has been reported elsewhere. Though one study from Nigeria reported no sex predilection in retinoblastomas. The disparity may be accounted from what is known epidemiologically on male predominance in retinoblastomas.

The orbit/eye in this study was found to be affected mostly by retinoblastomas similar to other studies whereas the cervical lymph nodes were involved by lymphomas correlating to other studies. <sup>10,13,24,26,28,30</sup> Jaws were afflicted by Burkitt's lymphoma in most occasions similar to what has been reported by Khademi et al. <sup>30</sup> Nasopharynx was affected by carcinomas and lymphomas in most occasions. These findings appear to be in line to some extent with those reported in other studies done elsewhere where nasopharynx was affected predominantly by carcinomas. <sup>20,30</sup> In this study, sinonasal cavity was predominantly afflicted by sarcomas. Similar findings were reported in the study which was conducted by Khademi et al in Iran and Siwillis et al in Tanzania where the sinonasal cavity (nasal cavity plus paranasal sinuses) was predominantly affected by sarcomas. <sup>27,30</sup>

This study had several limitations; the study was carried out in one tertiary hospital which may not be the representative of the entire country and the study being a snap shot experience over a relatively short period of time.

#### **CONCLUSION**

To the best of our knowledge, this is the first study to document the clinico-pathological profile of paediatric head and neck cancers in Tanzania. We demonstrate that there are many similar findings compared with other countries including predominance of lymphomas and retinoblastoma. This study also calls a high index of suspicion by clinicians when encountering paediatric patients with neck masses to rule out the possibility of lymphomas.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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