



# ORAL AND MAXILLOFACIAL TUMORS; AN AUDIT IN PAEDIATRIC PATIENTS ATTENDED IN MNH, TANZANIA: A 6 YEAR RETROSPECTIVE STUDY.

Dr. Karpal Singh Sohal<sup>1</sup>, Dr. Jeremiah Robert Moshy<sup>2</sup>

1. DDS  
Department of Dental Services,  
Muhimbili National Hospital,  
Dar es Salaam, Tanzania.
2. DDS, MDent.  
Department of Oral and  
Maxillofacial Surgery,  
Muhimbili University of Health and  
Allied Sciences  
Dar es Salaam, Tanzania.

**Correspondence Address:**

Dr. Karpal Singh Sohal  
Dental Services Department  
Muhimbili National Hospital,  
P.O. Box 65000 Dar es Salaam,  
Tanzania.  
karpal@live.com

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**ABSTRACT... Background:** The oro-facial region including the jawbones and related tissues can be the site of a multitude of neoplastic conditions. This region is minefield for many benign or malignant neoplastic conditions. The aim of this study was to determine the pattern of occurrence of oral and maxillofacial tumours amongst paediatric patients treated at Muhimbili National Hospital. **Study Design:** Retrospective study. **Setting:** Department of Oral and Maxillofacial Surgery in Muhimbili National Hospital (MNH). **Period:** January 2008 to December 2013. **Methodology:** Histological results of lesions that occurred in oral and maxillofacial region. Patient's demographic data, histopathological diagnosis and the type of tumour were recorded. The lesions were broadly grouped as benign and malignant. Data analysis was done using version 19 of SPSS computer program. **Results:** A total of 1447 histological results of patients with oral and maxillofacial lesions were obtained from the archives, of which 138 (9.5%) were histological results of children under 15 years. Male to Female ratio was 1:1. The age ranged from 0 to 15 years, mean age being  $10.8 \pm 3.8$ . The most affected age groups were of 6-10 and 11-15. Ameloblastoma was the most common benign lesion, while Burkitt's lymphoma was the commonest malignant lesions. **Conclusion:** Benign lesions are the most common oral and maxillofacial lesions among paediatric patients, and their prevalence increase with increasing age. The pattern of occurrence of oral and maxillofacial tumours in this study will be of interest to the clinicians and pathologists as it shades light to the trend of oral and maxillofacial lesion in children.

**Key words:** Paediatric patients, oral and maxillofacial tumour, Histopathological demographic pattern.

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## INTRODUCTION

The oro-facial region which includes the maxilla, mandible and related tissues can be the site of a multitude of neoplastic conditions. It is the sites for many cystic and neoplastic conditions which could either be benign or malignant.<sup>1</sup> Oral and maxillofacial swellings and masses encountered in children and teens may be similar to those seen in adults<sup>2</sup>, however there are several differences between the adult and child populations. Children differ from the general population not only because of their small size, but also because certain lesions have a predilection for this population group such as Langerhans cell histiocytosis and some types of lymphoma, leukaemia, and haemangioma.<sup>3</sup>

Oral lesions in children and adolescents, presents considerable variation with respect to the age,

prevalence and geographic distribution.<sup>4,5</sup> In spite of World Health Organization (WHO) suggestions regarding the epidemiologic assessment of oral lesions, the majority of studies on oral conditions in children includes the investigation of caries, periodontal disease, malocclusion and dental trauma<sup>6</sup>, and of the epidemiologic researches that have been done on orofacial lesions in children and adolescents, were focused on specific lesions such as maxillofacial malignancies<sup>7</sup>, salivary gland tumours<sup>8,9</sup> and odontogenic lesions.<sup>10,11</sup>

Telfan et al<sup>2</sup>, Asamoia et al<sup>12</sup> and Ulmansky et al<sup>13</sup> reported that in children and adolescents, neoplastic lesions are often benign and are of mesenchymal origin. A study from Tanzania by Rwakatema and Chindia<sup>14</sup> reported benign soft tissue lesions were the most common with

prevalence of 35.1%, followed by malignant soft tissue lesions which accounted for 21.8% while Akinmoladun et al.<sup>15</sup> in a histopathological review article of oral lesions in North East Nigeria reported a prevalence of 19.1% for reactive/inflammatory lesions, in contrast, Telfan et al.<sup>2</sup> reported prevalence of 95% for benign lesions of which cystic lesion were the commonest in a retrospective study from Jordan. Lima et al.<sup>5</sup> and Lei et al.<sup>16</sup> reported higher prevalence of benign lesion on comparison to the malignant lesions, with mucoceles and dentigerous cyst being the commonest.

Epidemiological studies add up as a large area of scientific research and play an important role, because they reveal the prevalence and incidence of several diseases and particularize their distribution according to specific characteristics of the environment where they are being analysed<sup>17</sup>, in addition, they contribute to the development of health measures directed at local realities by demonstrating the prevalence and incidence of diseases.<sup>18</sup> The aim of this study was to determine the pattern of oral and maxillofacial tumours among the paediatric patients treated at Muhimbili National Hospital.

**MATERIAL AND METHODS**

This was a retrospective study where by histological results of lesions that occurred in oral and maxillofacial region from 1st January 2008 to 31st December 2013 were obtained from the archives in the department of oral and maxillofacial surgery in Muhimbili National Hospital (MNH).

Patient’s age, sex, and histopathological diagnosis were recorded. Diagnosis was recorded as reported in the biopsy result slip. Reports of

fine needle aspiration cytology were excluded. Those reports which had no final diagnosis were excluded as well. In case where a single patient had more than one result, as one for pre-surgery incisional biopsy and another of post-surgical excision of the lesion, the post-op result was included. Only patients aged 15 years and below were included in the study.

The ages were divided into 3 groups of 0-5 years, 6-10 years and 11-15 years. The lesions were grouped broadly as benign and malignant, which were further sub grouped as odontogenic and non odontogenic for benign neoplasms, and for the malignant lesions, the sub grouping was based on tissue of origin, hence carcinoma, sarcoma and lymphomas.

The data for histological diagnosis and demographic data were entered into a dataset by a single researcher and data analysis was done by Statistical Package for Social sciences (SPSS) computer program version 19. Permission to conduct this research was granted by department of oral and maxillofacial surgery, MNH.

**RESULTS**

A total of 1447 histological results of patients with oral and maxillofacial lesions were obtained from the archives of histological results from year 2008 up to 2013, out of which 138 (9.5%) were histological results of children under 15 years. Of the 138 patients, males were 69 (50%) and females were 69 (50 %), hence male to female ratio of 1:1. The mean age was found to be 10.8 ± 3.8 years. Majority of the patients 59.4% (n= 82) belonged to the age group 11-15. Table-I summarizes the distribution of lesions by gender and age groups.

Age group	General Groups of Oral & maxillofacial lesion by Gender of the patient				Total (%)
	Benign		Malignant		
	Male	Female	Male	Female	
0-5	6	6	2	1	15 (10.9%)
6-10	18	16	3	4	41 (29.7%)
11-15	34	33	6	9	82 (59.4%)
<b>Total</b>	<b>58</b>	<b>55</b>	<b>11</b>	<b>14</b>	<b>138 (100%)</b>

Table-I. Distribution of the general group of oral and maxillofacial lesions by gender and age group

Out of these 138 histological results analysed, benign oral and maxillofacial lesions accounted for 81.9% (n= 113) and malignant lesions 18.1% (n= 25), thus ratio of benign to malignant lesion was 4.5:1. A total of 36 different types of benign lesions and 15 types of malignant lesions were reported. Most of common lesions regardless of benign or malignant were non-odontogenic lesions encompassing for 59.4% (n=82), while carcinomas were least common constituting only 4.3% (n=6). Table II and III.

General classification of Lesions	Frequency	Percentage
Benign non odontogenic lesions	80	58.0
Benign odontogenic lesions	33	23.9
Sarcomas	11	8.0
Lymphomas	8	5.8
Carcinomas	6	4.3
<b>Total</b>	<b>138</b>	<b>100.0</b>

**Table-II. Distribution of the general classes of oral and maxillofacial lesions**

Of the benign lesions, non odontogenic lesion accounted for 72.6%, and the ratio of non-odontogenic to odontogenic lesions was 2.65:1. Amongst the 31 benign odontogenic lesions, 6 types of lesion were reported of which Ameloblastoma was the commonest, followed by dentigerous cyst and Odontogenic Myxoma. Of the 82 Non odontogenic tumours in this study, a total of 30 different types of lesion were encountered, and ossifying fibroma was the commonest, followed by fibrous dysplasia and pyogenic granuloma. Table-IV.

The age groups 6-10 and 11-15 were found to be more affected by benign lesions. Ameloblastoma, ossifying fibroma, fibrous dysplasia and pleomorphic adenoma were more prevalent in age group 11-15, while haemangioma was observed in age groups 0-5 and 6-10. Fibrous dysplasia was exclusively found in age group of 11-15 (Table-V). The overall difference observed in occurrence of benign paediatric oral and maxillofacial lesions between different age groups was statistically significant (p= 0.004).

Odontogenic lesions	
	Frequency
Ameloblastoma	21
Dentigerous cyst	4
Keratocystic odontogenic tumour	3
Adenomatoid Odontogenic tumour	1
Compound odontoma	1
Radicular cyst	1
<b>Non Odontogenic lesions</b>	
Ossifying fibroma	11
Fibrous dysplasia	9
Pyogenic granuloma	9
Haemangioma	5
Squamous cell papilloma	5
Pleomorphic adenoma	5
Central giant cell tumour	4
Odontogenic myxoma	4
Fibroma	3
Neurofibroma	3
Dermoid cyst	2
Lymphoepithelial cyst	2
Neurilemmoma	2
Osteoma	2
Cherubism	1
Chondromyxoid fibroma	1
Eosinophilic granuloma	1
Fibromatosis	1
Fibromyxoma	1
Granular cell tumour	1
Harmatoma	1
Hibernoma	1
Lipoma	1
Lymphangioma	1
Neurofibrolipoma	1
Non ossifying fibroma	1
Peripheral granuloma	1
Ranula	1
Schwanoma	1
Xanthogranuloma	1

**Table-III. Frequency of occurrence of different odontogenic and non-odontogenic benign lesions**

The overall difference observed in occurrence of benign oral and maxillofacial lesions between different age groups was statistically significant (p= 0.004).

In the case of odontogenic lesions, female patients composed 61.3% (n=19). The female to male

ratio was 1.6:1. The age group 11-15 years was the commonest (67.7%, n=21), followed by age group 6-10 years (32.3%, n=10), the age group 0-5 had no patient diagnosed with odontogenic lesions. The mean age for odontogenic lesion was 11.7 ± 2.9 years.

Sarcomas	
	Frequency
Haemangiopericytoma	2
Kaposi sarcoma	2
Osteosarcoma	2
Chondrosarcoma	1
Malignant fibrous histiocytoma	1
Malignant schwannoma	1
Neurofibrosarcoma	1
Rhabdomyosarcoma	1
Lymphomas	
Burkitt's lymphoma	5
High grade lymphoma	1
Hodgkin lymphoma	1
Lymphoma	1
Carcinomas	
Squamous cell carcinoma	3
Adenocarcinoma	2
Carcinoma NOS	1

**Table-IV. Frequency of occurrence of different malignant lesions**

On the other hand, for non odontogenic lesions, there were more male patients; the male to female ratio was 1.3:1. The age group 11-15 years was the commonest (56.1%, n=46), followed by age group 6-10 years (29.3%, n=24) while age group 0-5 was the least common (14.6%, n=12). The mean age for non-odontogenic lesion was 10.4 ± 4.2 years.

The malignant conditions were grouped in relation

to their tissue of origin; Sarcomas were the most common accounting for 44% of cases followed by lymphomas 32% and Carcinoma comprised 24% of the malignant lesions. Burkitt's lymphoma was found to be the most common malignant lesion in our setting, followed by Squamous cell carcinoma and Kaposi's sarcoma.

The age group 11-15 was found to be more affected by carcinomas and sarcomas while lymphomas mostly affected the age groups 6-10 and 11-15. In general, the age group 11-15 was mostly affected by the malignant lesions. However the difference observed was statistically insignificant (p=0.44). There were more of females than males in group of carcinomas and sarcomas except for lymphomas, however the difference observed was statistically insignificant p= 0.82. Table-VI and VII.

**DISCUSSION**

Oral and maxillofacial tumours in children show significant difference when compared with adults as far as clinical behaviour and histopathological feature are concerned. They are indicative of diverse pathological conditions from real neoplasms to hamartoma.<sup>19</sup> The aetiology of most oral and maxillofacial neoplasms remains unknown. Genetic susceptibility as well as environmental factors such as viral infection, nutritional deficiencies, and trauma to mention a few, has been suggested as their risk factors.<sup>20</sup>

In the current study, we analysed the prevalence of the biopsied Oral and Maxillofacial lesions occurring in paediatric patients who presented in our department at Muhimbili National Hospital, Tanzania.

Condition	Age group			Total
	0-5	6-10	11-15	
Ameloblastoma	0	7	14	21
Ossifying fibroma	0	3	8	11
Fibrous dysplasia	0	0	9	9
Pyogenic granuloma	3	2	2	9
Haemangioma	2	2	1	5
Pleomorphic adenoma	0	1	4	5
<b>Total</b>	<b>6</b>	<b>20</b>	<b>43</b>	<b>69</b>

**Table-V. Distribution of top 10 conditions according to age group**

Age group	General Group of malignant lesion			Total
	Carcinoma	Sarcoma	Lymphoma	
0-5	2	1	0	3
6-10	0	2	5	7
11-15	4	8	3	15
<b>Total</b>	<b>6</b>	<b>11</b>	<b>8</b>	<b>24</b>

**Table-VI. Distribution of malignant oral and maxillofacial lesions by age group**

Subsets of general group categories do not differ significantly from each other at the .05 level. p= 0.44.

General group of malignant lesion	Gender		Total
	Male	Female	
Carcinoma	1 <sub>a</sub>	4 <sub>a</sub>	5
Sarcoma	4 <sub>a</sub>	5 <sub>a</sub>	9
Lymphoma	5 <sub>a</sub>	5 <sub>a</sub>	10
<b>Total</b>	<b>10</b>	<b>14</b>	<b>24</b>

**Table-VII. Distribution of malignant oral and maxillofacial lesions by gender**

Subset of general group categories column proportions do not differ significantly from each other at the .05 level. p= 0.52.

The data of the present study show that 9.5% of the biopsies were related to paediatric patients. These results were lower than those reported by a study in Iran by Torabi et al<sup>21</sup> (14.59%), Dhanuthai et al.<sup>3</sup> (15.05%) as well as in other study conducted previously in Brazil<sup>22</sup> (13.1%); higher values were observed when compared to 8.2% reported by Jones and Franklin in a 30-year study in Europe<sup>4</sup>, and 6.5% reported in South Africa<sup>23</sup>, Shah et al.<sup>24</sup> reported 7% and Lima et al.<sup>5</sup> who reported 6.6%. General differences between various studies can be due to the inclusion criteria, including age range or locations (oral or oral and maxillofacial). In addition, population's genetic background, geographical area, study design and the type of medical centre in which the study is conducted can play a role in these differences.<sup>3</sup>

In this study, there was no sex predilection observed, the ratio of male to female patient being 1:1, However, Telfah et al<sup>2</sup> reported ratio of 1.5:1 in a study done in Jordan, likewise in a study done in southern Taiwan by Lei et al. the ratio of 1.18:1 was reported in favour of male patients.<sup>16</sup> In contrast to the findings of our study, Dhanuthai et al. reported ratio of 1:1.23 in study done in northern Iran<sup>3</sup>, while a study by Lima et al found the ratio of 1:1.1 in favour of female patients.<sup>5</sup> These differences in studies may be attributed to population's genetic background and study design.

The frequency of both malignant and benign neoplasms in the current study was significantly higher at the age group of 11 - 15 years than at the other two age groups. These results are comparable to study from Taiwan by Lei et al.<sup>16</sup> and Jones and Franklin.<sup>4</sup> A number of other researchers have reported higher incidences of tumour in the age group 11-15 years.<sup>25,26</sup> In contrast to the study by Tanaka et al.<sup>27</sup>, who reported the age group 6-11-year to be the most affected. The age of 11-15 presents with accelerated growth especially in the bone, hence chances of neoplastic changes to occur are likely in this period of growth.

Findings of the study reported benign lesions being predominant to the malignant lesions with occurrence of 81.9% and 18.1%. Several studies have reported higher prevalence of benign lesion to that of malignant one, yet frequency of occurrence differs. Results almost similar to our study were reported by Keszler et al.<sup>1</sup> and Mauchrek et al.<sup>2</sup> where benign lesion accounted for 84% and 81.1% respectively. Several other studies reported frequency ranging from 52.6% to 78.2%, in favour of the benign lesions<sup>14,30,31</sup>, while other studies reported frequency of 90.4% up to 98.8% in favour of benign lesions.<sup>5,26,27,32,33</sup> However to the contrast of this study, Aregbesola et al.<sup>34</sup> reported higher frequency of malignant lesions 51%. All these differences depend upon the centre where the study was conducted. For



instance, in referral centres definitely more referral cases of malignant lesions would be captured since they could not be managed at primary or tertiary centres.

In this study, we grouped the benign lesions into Odontogenic and Non Odontogenic. We found higher prevalence of non odontogenic tumour, when compared to the odontogenic counter parts, similar findings has been reported by several researchers.<sup>25,26,32</sup> The prevalence of non odontogenic lesions can be explained by the fact that these lesions have vast source of origin (e.g. infections, trauma and genetics) unlike odontogenic lesion which are derived from epithelial, ectomesenchymal and/or mesenchymal elements of the tooth-forming apparatus. It seems that the non odontogenic lesions have genetic influence rather than developmental influence which manifests later in the course of development of teeth, that is found in odontogenic tumours.

Of the Non odontogenic lesions, Ossifying fibroma was the most frequently encountered lesion, in contrast to some studies which reported Central giant cell lesion as the commonest<sup>32,39</sup>, however Chen et al.<sup>26</sup> and Sato et al.<sup>40</sup> in their studies, reported haemangioma to be the most common non odontogenic tumour and Lei et al.<sup>16</sup> in a study done in Taiwan, found Fibroma to be the prevalent non odontogenic lesion. It is worth commenting that the cases of haemangioma reported in this study are low than actual situation since this study dealt with results of only biopsied lesions, and not the fine needle cytology results.

The study findings report ameloblastoma to be the most common odontogenic tumour, and this concurs with studies done elsewhere with similar findings being reported.<sup>3,10,11</sup> However our study findings, contrasts other studies which reported odontoma as being the most common odontogenic lesion.<sup>4,5,26</sup> This difference can be explained by the fact that in this part of the world, patient seek treatment in case of pain or severe facial disfigurement, and odontomas are usually asymptomatic and are in most cases accidental

findings during radiological investigation.

Malignant conditions were assembled into three groups in relation to their tissue of origin; Sarcomas were the most common followed by lymphomas and carcinomas. This is in contrast to findings of Ogunlewe et al.<sup>35</sup> and Barnes et al.<sup>36</sup>, who reported that Sarcoma of the orofacial region as being less common than carcinomas. Similarly Al Yamani et al.<sup>31</sup> in a study of head and neck pathology in Jeddah, reported Lymphomas were the most common followed by Sarcomas.

Burkitt's lymphoma was found to be the most common malignant lesion in our setting followed by Kaposi's sarcoma and Squamous cell carcinoma. The findings of Burkitt's lymphoma being the commonest malignant lesion concede with findings of other studies done in Africa and some other countries, which also reported similar findings.<sup>14,30,37</sup> AIDS in children is most prevalent in sub-Saharan Africa where 90% of all children with AIDS live.<sup>38</sup> Immunosuppression rather than HIV itself is implicated in pathogenesis of these malignancies (Lymphoma and Kaposi's sarcoma). Moreover, in Africa, Burkitt's lymphoma is common in young children who also suffer from Malaria.

Findings of this study might need some caution in interpretation for some inherent limitations. The study enrolled biopsy results found in the archives of department of oral and maxillofacial, and not all the biopsied lesion results were believed to be found, since some results might have been lost. In addition, some lesions were not biopsied such as haemangioma and vascular malformations, mucocoeles and eruption cysts.

Therefore the present study shades light on the audit of oral and maxillofacial lesion that occurs in paediatric patients in our setting. Results of this study might be considered as a preliminary registry for Tanzanian as well as neighbouring countries which share the same geographical location, on oral and maxillofacial lesions in paediatric patients thus help clinicians in their differential diagnosis.

## CONCLUSION

The Oral and Maxillofacial lesions in paediatric patients in this series are rare and that benign lesions are the most common amongst Paediatric patients. Ameloblastoma was the most common lesion, followed by ossifying fibroma amongst the benign lesions, while Burkitt's lymphomas was the most common malignant lesion followed by Kaposi's sarcoma. The pattern of occurrence of oral and maxillofacial tumours in this study will be of interest to the pathologists, oral and maxillofacial surgeons, paediatric physicians, paediatric dentists and general dental practitioners as it roughly shades light to the trend of oral and maxillofacial lesion in children.

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
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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Karpal Singh Sohal	Study designing, data collection, entry and analysis. Preparation of manuscript. Final reading and approving of the manuscript.	
2	Dr. Jeremiah Robert Moshy	Study designing, Preparation of manuscript. Final reading and approving	