TREND AND PATTERN OF ORAL AND MAXILLOFACIAL PATHOLOGY IN PEDIATRIC PATIENTS IN JIMMA SOUTH WEST ETHIOPIA

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Trend and Pattern of Oral and Maxillofacial Pathologies in Pediatric Patients of 5 Years Retrospective Study at JUMC, Jimma, South West Ethiopia

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Abstract

Background: The complex development of the facial skeleton and the presence of odontogenic and others tissue contribute to formation of a variety of multitude of neoplastic conditions, cysts, and others pathologic conditions. Securing their healthy development and growth should be a major concern of all societies as children represent a time ahead. Despite this there is null literature reporting the prevalence of oral and maxillofacial pathologies focused in the pediatric population in Ethiopia. So this study has served as a template and baseline for future study on this particular age group.

Objective: The intention of this study was to assess trend and pattern of oral and maxillofacial pathology among pediatric patients visiting JUMC within 2015 - 2019.

Method and Methodology: 5 year retrospective studies was conducted at Department of Maxillofacial, Jimma University. Records of all 133 pediatric patients visited maxillofacial clinic in JUMC from September 2015- August 2019 was retrieved from record office. 113 cases were selected in this study. Others were excluded due to inadequate information within the chart. Patient's demographic data, histopathological diagnosis and the anatomic sites of lesions were recorded. The lesions were broadly grouped as benign and malignant. Data analysis was done using version 20 of SPSS computer program. Descriptive analysis were computed as frequency of lesions, distribution of age, gender, diagnosis, and anatomical location of oral and maxillofacial pathologies in the pediatric patients. The collected data was presented using tables and figure.

Result: In this study 70 cases were found in male and 43 cases were in female pediatric patients. The highest frequency of lesions (43.3%) were observed in 12-16 years age group followed by 8-12 years old age range. Most of the lesions are benign (105, 92.9%), only 8 (7.1%) cases were malignant.
Rhabdomyosarcoma (3 cases) is common malignant lesion followed by osteosarcoma (2 cases). Mucocele (9), dentigerous cyst (8), hemangioma (7), ranula (7), nasal polyp (7), antrochoanal polyp (5), ossifying fibroma (4) were the most common lesions among the benign lesions. The most common of which were the maxilla (28, 24.8%) followed by mandible (25, 22.1%).

Conclusion: This study investigated the trend and pattern of these lesions in JUMC, Ethiopia which helps to quantify & analyze the range of maxillofacial pathology in pediatric population. In addition it assist as a point for a much needed population based study.

Key words: pediatric, pathology, oral and maxillofacial lesions

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Acronyms

WHO - World Health Organization

OKC - Odontogenic keratocyst

OMF - Oral and maxillofacial

PGCG - Peripheral Giant Cell Granuloma

CGCG - central giant cell granuloma

Yrs. - years

AOT - Adenomatoid odontogenic tumor

ABC - Aneurysmal bone cyst

MEC - Mucoepidermoid carcinoma

ACC – Adenoid cyst carcinoma

NOS -- Not otherwise specified

TMJ – Temporomandibular joint

PNETs - primitive neuroectodermal tumor

CNS – Central nervous system

JUMC – Jimma University Medical Center

Tables of contents

List of tables

List of figure

CHAPTER ONE

1. INTRODUCTION

1.1 Background Information

Oral and maxillofacial pathology in pediatrics are the diseases affecting the mouth, jaws, nasal and paranasal sinus, soft palate, salivary glands, fascial spaces, temporomandibular joints, facial muscles and skin. Maxillofacial pathologies in pediatric patients categorized based on different factors. Accordingly, cysts and tumors in the maxillofacial skeleton are classified as *odontogenic* or *nonodontogenic* based on the tissue of origin. The odontogenic pathology is further sub-classified based on contributing tissue, epithelium or mesenchyme whereas non-odontogenic tumors are grouped based upon the cell line of origin and their histologic appearance or behavior.

Odontogenic Tumors: *Ameloblastoma, AOT, Odontogenic myxoma, Cementoblastoma, Cementifying fibroma, Ameloblastic fibroma, Odontoma, Ameloblastic fibro-odontoma*

Odontogenic cysts: *Gingival cysts of the newborn or eruption cyst, palatine cysts of the newborn or Epstein's pearls, dentigerous cyst, OKC*

Benign mesenchymal origin tumors: *Giant cell lesions (CGCG, the brown tumor of hyperparathyroidism, and the giant cell tumor), fibro-osseous lesions (fibrous dysplasia, cherubism, ossifying fibroma juvenile (aggressive)), osteoblastoma, desmoplastic fibroma*

Neurogenic origin tumors: *congenital granular cell tumor, mucosal neuroma, neurofibroma, melanotic neuroectodermal tumor of infancy.*

Hematopoietic reticuloendothelial tumors*: Burkett's lymphoma, Langerhans' cell histiocytosis, Hodgkin's disease, Non-Hodgkin's lymphoma.*

Vascular pathology: *Hemangioma, Vascular malformation, ABC.*

Epithelial neoplasm: *SCC, nevoid basal cell carcinoma*

Mesenchymal neoplasm: *Ewing sarcoma, primitive neuroectodermal tumor (CNS PNETs, neuroblastoma, Peripheral PNETs (pPNETs)), Osteosarcoma, chondrosarcoma, Rhabdomyosarcoma*

Congenital masses*: dermoid cyst**, t**hyroglossal duct cyst**, branchial** cleft cyst, epidermoid cyst, ranula, laryngocele, lymphangioma, hemangioma, teratoma, fibromatosis coli, and thymic cyst**.**

Inflammatory salivary gland disease*:* *Mumps, Chronic recurrent bacterial infections*

Cystic conditions of the salivary glands: *Mucocele, Ranula*

Benign salivary gland tumors: *Pleomorphic adenoma***:**

Malignant salivary gland tumors: *Mucoepidermoid carcinoma*

Infectious diseases: *osteomyelitis, actinomycosis*

TMJ disorders: *ankyloses, dislocation, TMJ tumors.*

1.2 Statements of problem

Children are a prominent part of the general population, having different types of diseases**.** But due there is no of numerous comprehensive case series that specifically address pediatric maxillofacial pathology. Nevertheless, the maxillofacial surgeon should be familiar with at least the most commonly encountered lesions in the immature, developing child (1).

The majority of oral lesions are confined to orofacial tissues, but numerous underlying systemic conditions may present with signs and symptoms within the oral cavity. Identification of oral and maxillofacial pathologies plays a major role in improving early prevention and detection, rapid treatment and provision of better health services (2, 3).

In spite WHO suggestions regarding the epidemiologic assessment of oral lesions, most of studies on oral disease in pediatrics research on tooth decays, periodontal problem, dental trauma and malocclusion. Although the distribution of pediatric oral and maxillofacial pathology in wide areas of the region includes jaw cysts, odontogenic tumors, non-odontogenic, malignant tumors of the jaw and oral cavity, salivary gland tumors and cyst, skin lesions of the face (3).

Previous study display that the most prevalent lesions are inflammatory/reactive, cystic and neoplastic lesions, respectively. In general, benign tumors were more prevalent than malignant tumors. So understanding the occurrence and determining the characteristics of these lesions in the pediatric population provides a firm groundwork for proper diagnosis and treatment (3).

Children represent the future, and ensuring their healthy growth and development should be a major concern of all societies. Newborns and children infectious diseases, many of which can be effectively prevented or treated. Also identification of malignant lesions is important for making preventive action and making an early diagnosis, and in addition for more favorable prognoses, leading to more effective treatments of the lesion. For this reason, the number of new cases of oral lesions in this population deserves the attention of public health policies, so that these lesions can be diagnosed and treated early to promote the quality of life of this population. Therefore, it is possible to bring down impact on health outcomes like cost and quality of life (4).

The world population is expected to reach 9.7 billion by 2050. This is accompanied by a high incidence of maxillofacial and systemic diseases. Studies on the epidemiology of oral disease, based on biopsies obtained worldwide from pediatric patients, have probed a frequency of such diseases, ranging from 5.2% to 12.8% of the total number of biopsies. Nevertheless, the number of epidemiological studies on pediatric patients is still limited, and further information is required and important (4).

Generally, the results reported in the literature concerning the most prevalent lesions in the pediatric population. Most detected lesions were benign, and malignant lesions were diagnosed in a very small part of the whole sample. The epidemiologic survey of oral and maxillofacial lesions biopsied in children is important to determine lesion prevalence in different geographic areas. This type of study also contributes with the characterization of lesion specificities in the pediatric population, providing to general dentists and pediatric dentists a solid background for diagnosis and treatment of the entities (5).

Although there is increasing literature regarding the incidence and prevalence of pediatric oral and maxillofacial pathology, there is no study investigating the range and frequency in Ethiopian children.

Hence, this study will try to assess types, prevalence of oral and maxillofacial pathologies in pediatric patients as this plays an important role in the quality assurance of the health care process and the quality of life. Furthermore, identification and documentation of oral and maxillofacial pathologies in pediatric is undoubtfully important in achieving treatment goals of patients' clinical, economic and humanistic outcomes.

CHAPTER TWO

2.1. Literature review

Pediatrics display a wide spectrum of oral lesions including hard and soft tissue lesions of the oral maxillofacial region. The information regarding prevalence of pediatric oral lesions is scanty but US places the prevalence rate in 4-10% excluding infants these lesions include mucosal conditions, developmental anomalies, neoplastic, reactive or inflammatory lesions. The few documented research on oral biopsy in pediatric groups has largely been those from the Americas, Europe, United Kingdom and Asia. Such studies have emerged from Turkey, Southern Taiwan, Thailand, as well as North America and South America. Most of these studies focused only on a particular type of pediatric dental lesion among specific populations. However, there are only a few notable pediatric biopsy studies emanating from sub-Saharan Africa, despite its high burden of diseases(6).

As study done among 1023 maxillofacial biopsies in paediatric patients with 0 – 15 years age range from 1097 – 2011 Southern Taiwan, inflammation/reactive lesions account about 44.09 %, then tumour/tumour-like lesions 23.46%, cystic/pseudo cystic lesions 19.16 % and other miscellaneous lesions 13.29%. In this study most of the lesions are found in the age group 11 – 15 years. The most common of all lesions is mucocele 22.78%, odontoma 10.56 %) and 3.52% is fibroma (7).

In Brazil a retrospective descriptive study is done from 2000 – 2015 on biopsy records of 1,706 oral and maxillofacial lesions in pediatric patients. Accordingly, most the lesions are located on lips (34.5%), followed by mandible (19.9%) and maxilla (13.5%). Most of lesions are commonly noticed in the 9-12 year age group children in this study. The same study, displays benign (16.9%) tumors are the most common. The malignant are accounted about 1.3% among the neoplasms diagnosed in pediatric patients (4).

As study in Pelotas-Brazil on 625 (F= 53%) pediatric patients with oral and maxillofacial lesion, most of the lesions frequent in age group 7-14 years. Concerning the diagnosis categories the highest number of cases exhibited the salivary gland lesions, cystic lesions & healthy tissues/teeth groups respectively. In this study mucocele (17.2%) is the most common lesions and dentigerous cyst is 8.6% among whole lesions. Malignant lesions are rare account 1.2% of the total lesion (5).

In retrospective analysis of 1305 oral lesions specimens (M: F=1.13) gathered from pediatric patients 0-16 years for 58 yrs in Australia. In this study dental pathology (24.4%) the most common, followed by

odontogenic cysts (18.5%) and mucosal pathology (17.0%). Dentigerous cyst (9.4%) is the most commonly identified lesion in this study (8).

According to study conducted in Persian populations of 154 (M: F=1.14) pediatric patients (0-18yrs) diagnosed with oral and maxillofacial pathology over 12-years, gingiva and lip are the most common sites of lesions. Benign and malignant tumors are constituted 12.3% and 4.5% of cases respectively. In this analysis specifically, common lesion are pyogenic granuloma (13.6%), PGCG (9.1%), dentigerous cyst (7.8%), radicular cyst (5.2%) and mucocele (5.2%). The most frequent benign tumor is hemangioma (26.1%) and from malignant MEC (28.6%) & SCC (28.6%) are the most prevalent tumors (3).
In review performed in 10 year (1986-1996) in African, Nigeria patients 1-16 years ages range mandible (380, 67.7%) is commonly affected sites than maxilla (181, 32.3%). Malignant lesions is represent 18.8 % and 28.8 % is benign (9).

Other study on pediatrics in Nigeria shows ameloblatoma is accounts 24% of 105 cases. Benign bone pathologies (25%), hyperplastic reactive lesions (22%) and primary malignancies (6%), are others encountered lesions (10).

In Rio de Janeiro over a 75-year period (1942-2017) retrospective analysis is conducted on 2408 patients aged 0-19 years (F: M =1.17:1). In this study Salivary gland lesions (24.30%) are the most common lesions. Specifically, mucocele is the most common lesion (21.72%), followed by dentigerous cyst (6.48%) and fibrous hyperplasia (6.44%). From cases of malignant lesions, Burkitt lymphoma is the most frequent (11).

Of the 105 cases, in Japan, 102 (97.1%) involved tumors that were benign; only 3 patients (2.9%) had tumors that were malignant. With regard to benign soft tissue tumor, the most common type was hemangioma (25/69; 36.2%), the second most common type is papilloma (19/69; 27.5%), and the most common site is the tongue. With regard to bone tumor, the most common type is odontoma (14/33; 42.4%), the second most common type is ameloblastoma (11/33; 33.3%), and the most common site is the mandible (7).

As study carried out in Australia on 676 lesions involving the oral and maxillofacial region are collected from patients aged 0-18 years (mean age 8.71 years). A total of 97.37% of cases were benign, with connective tissue and salivary gland lesions most frequently cases. Mucoceles (19.23%) were most commonly diagnosed, followed by dentigerous cysts (5.62%) (12).

According to study in Iran on 1267 cases in less than 18 years old, the most common location is lower jaw followed by upper jaw and the least common location is floor of the mouth. 4.6% of lesions were in hard tissue (upper and lower jaw). The most common lesions in upper jaw are odontogenic cysts (162,

57.9%) and bone pathology (28, 10%). The most common lesions in lower jaw are odontogenic cysts (201, 48.9%) and bone pathology (79, 19.2%). The most common lesions in the soft tissue of oral mucosa are reactive lesions (290, 50.4%) and salivary gland lesions (70, 12.4%) (13).

2.2. Significance of the study

The complex development of the facial skeleton and the presence of odontogenic tissue contribute to formation of a variety of cysts, tumors, and pathologic conditions that either are unique or occur more often in this region in the pediatric age group. Lesions of the maxillofacial region in children are generally infrequent and may represent a variety of clinical and pathologic entities. The rarity of these conditions explains the lack of numerous comprehensive case series that specifically address pediatric maxillofacial pathology. Nevertheless, the maxillofacial surgeon should be familiar with at least the most commonly encountered cysts and tumors, odontogenic or non-odontogenic in origin and their behavior.

There is no previous study findings concerning prevalence of oral and maxillofacial pathologies in pediatric patients in our country Ethiopia

Hence, this study will try to assess types, trend and pattern of oral and maxillofacial pathologies in pediatric patients as this plays an important role in the quality assurance of the health care process and the quality of life. Furthermore, identification and documentation of oral and maxillofacial pathologies in pediatric is un-doubtfully important in achieving treatment goals of patients' clinical, economic and humanistic outcomes.

In addition, it contribute for the descriptive epidemiology of maxillofacial pathologies in pediatrics and it is intended that data from this study will also serves as a template and baseline for future study on this particular age group.

CHAPTER THREE

2. Objectives

2.1 General Objective

- To analyze the trend and pattern of oral and maxillofacial pathologies in pediatric patients at Jimma University Medical Center, South West Ethiopia

2.2 Specific objectives

- To determine pattern of lesion in body regions.
- To assess distribution of age range in relations to gender of the pediatric patient
- To identify malignant lesions in age distribution of pediatric patients.
- To analyze lesions category and specific histologic diagnosis among male and female pediatric
- To evaluate histological diagnosis and its anatomic locations

CHAPTER FOUR

3. Methods and Participants

3.1 Study area and period

This study was carried out among pediatric patients with oral and maxillofacial pathologies at JUMC. It is found in a Jimma town, which is located 351 km South West of Addis Ababa and provides health care service with 1600 staff members and 800 beds for about 15 million people comprising of Jimma Zone and other surrounding zones and regions. It contains of many departments such as Dentistry, gynecology, internal medicine, surgery, ophthalmology, pediatrics, pharmacy, pathology and laboratory and others public health departments. It is the only teaching center in the zone. The study was conducted from June to august, 2019.

3.2 Study design

Retrospective study

3.3 Population

3.3.1 Source population

All pediatric patients with oral and maxillofacial pathologies that have been visited JUMC Maxillofacial clinic within a period of 5 years from September 2015 – August 2019.

3.3.2 Study population

All pediatric patients with oral and maxillofacial pathologies that have been treated at specified center and period.

Inclusion criteria was:

Pediatric patients who are diagnosed with oral and maxillofacial pathologies through histopathology or with typical clinical or radiographic pictures

The following was *exclusion criteria*:

Patients with incomplete chart like lack of clinical or histopathologic diagnosis

3.4 Sample size and sampling technique

3.4.1 Sample size Determination

All pediatric patients that have been diagnosed with oral and maxillofacial lesions within a period of 5 years from September 2015 – July 2019 who fulfil inclusion criteria.

3.4.2 Sampling technique

All charts of patient's fulfil the inclusion criteria was incorporated in the study.

3.5 Variables

Independent variables:

- Histopathologic diagnosis
- Site of the lesion
- Size of lesion
- Age
- Sex
- Family history
- Duration of disease
- Place of residence
- Comorbidity

Dependent variables:

- Procedure done
- Treatment outcomes

3.6 Data collection procedures

Data collection was undertaken in July, 2019 at JUMC. Data was collected through medical record reviews of patients using a prepared data extraction format on, socio-demographic, histologic diagnosis, sites of lesions. Data was collected over a 21 days period by general dentist being supervised by 2 maxillofacial residents.

Identification of disease was done by using biopsy result/histopathologic diagnoses or typical clinical or radiographic feature documented in patient's chart.

3.6.1 Disease Classification and Categorization

Classification and categorization of oral and maxillofacial pathology is according to latest WHO classification as depicted in Annex II (14, 15).

3.7 Operational definitions and Terms

Comorbidities:-any significant disease which coexists with oral and maxillofacial pathology

Oral and maxillofacial pathologies – any pathologic lesions in regions of maxillofacial areas.

Pediatrics – individual less than or equal to sixteen years old

Pathology- includes lesions such as neoplasia, hamartoma, teratoma, cysts, vascular malformations, TMJ disorders and other congenital lesions.

3.8 Data quality assurance

3.8.1 Pre-test

For consistency purposes, prior to data collection the data extraction format pretested on selected patient's chart, so appropriate adjustment was made on the data collecting instruments. The data collectors were strictly supervised daily and the principal investigator was review all filled format so that any suggestion and corrections were given soon.

3.9 Data analysis

Completeness of the data was checked every day cleaned, coded and entered in SPSS version 20.0 computer program for analysis by the principal investigator. Descriptive analysis was computed as frequency, percentages, cross tabulation, of different variables were determined. Finally the out puts of processed data was presented using tables, & figures.

3.10 Ethical Consideration

Ethical clearance was obtained from Research and Ethics Committee of Jimma University and permission was required from the Hospital record office before the study by the letter wrote from maxillofacial department. Patients' names were not recorded on the checklist to guarantee confidentiality of the information

3.11 Dissemination plan

The findings of this study were presented to all concerned bodies such as maxillofacial department, JUMC, MOH, professional associations. Publication can also be considered on peer reviewed reputable journal.

CHAPTER FIVE

Results

From a total of 133 pediatric patients diagnosed with oral and maxillofacial pathology at maxillofacial surgery unit during 2015-2019, 113 cases were selected in this study. Others were excluded due to inadequate information within the chart. So 113 cases with age range of 0-16 years studied.
The patients were divided into four age categories of 0-4 years old, 4-8 years old, 8-12 years old and 12-16 years old. Accordingly, 49 (43.4%) of cases were in 12-16 years old group, 37 (37%) were in 8-12 years old and 0-4 years old group were the least which accounted 9(8%) of the cases (table 1)

In this study 70 cases were found in male and 43 cases were in female pediatric patients. The highest frequency of lesions (43.3%) were observed in 12-16 years age group followed by 8-12 years old age range (*table 1*).

Table 1: Distribution of age range in relations to gender of the pediatric patients

Age range of the patients	Gender of the patient		
	Male	Female	Total
0-4	9	5	14(12.4%)
5-8	12	4	16 (14.2%)
9-12	22	15	37 (32.7%)
13-16	27	19	46 (40.7%)

Most of the lesions are benign (105, 92.9%), only 8 (7.1%) cases were malignant. Although not common in children, different histological types of malignant neoplasms were diagnosed. In this particular study rhabdomyosarcoma (3 cases) is common malignant lesion followed by osteosarcoma (2 cases). In general it was more common in 8-16 years old age ranges of pediatric patients in this study (*table 2*).

Table 2: Malignant lesions in age distribution of pediatric patients.

Malignant pathology	age of the patient in year				Total
	0-4	4-8	8-12	12-16	
pPNET	1	0	0	0	1
SCC	0	0	1	0	1
Osteosarcoma	0	0	1	1	2
Rhabdomyosarcoma	0	1	1	1	3
Hemangiopericytoma	0	0	0	1	1

The lesions affect different sites of maxillofacial area. The most common of which were the maxilla (28, 24.8%) and mandible (25, 22.1%) followed by the nasal & maxillary sinus (18, 15.9%), the floor of mouth (13, 11.5%), the lip (9, 8%), the tongue (8, 7.1%), the palate (4, 3.5%), the buccal mucosa (3, 2.7%), per auricular & TMJ each 2 cases (1.8%) and the least is periorbital lesion (1, 0.9%) (*Figure 1 & table 4*).

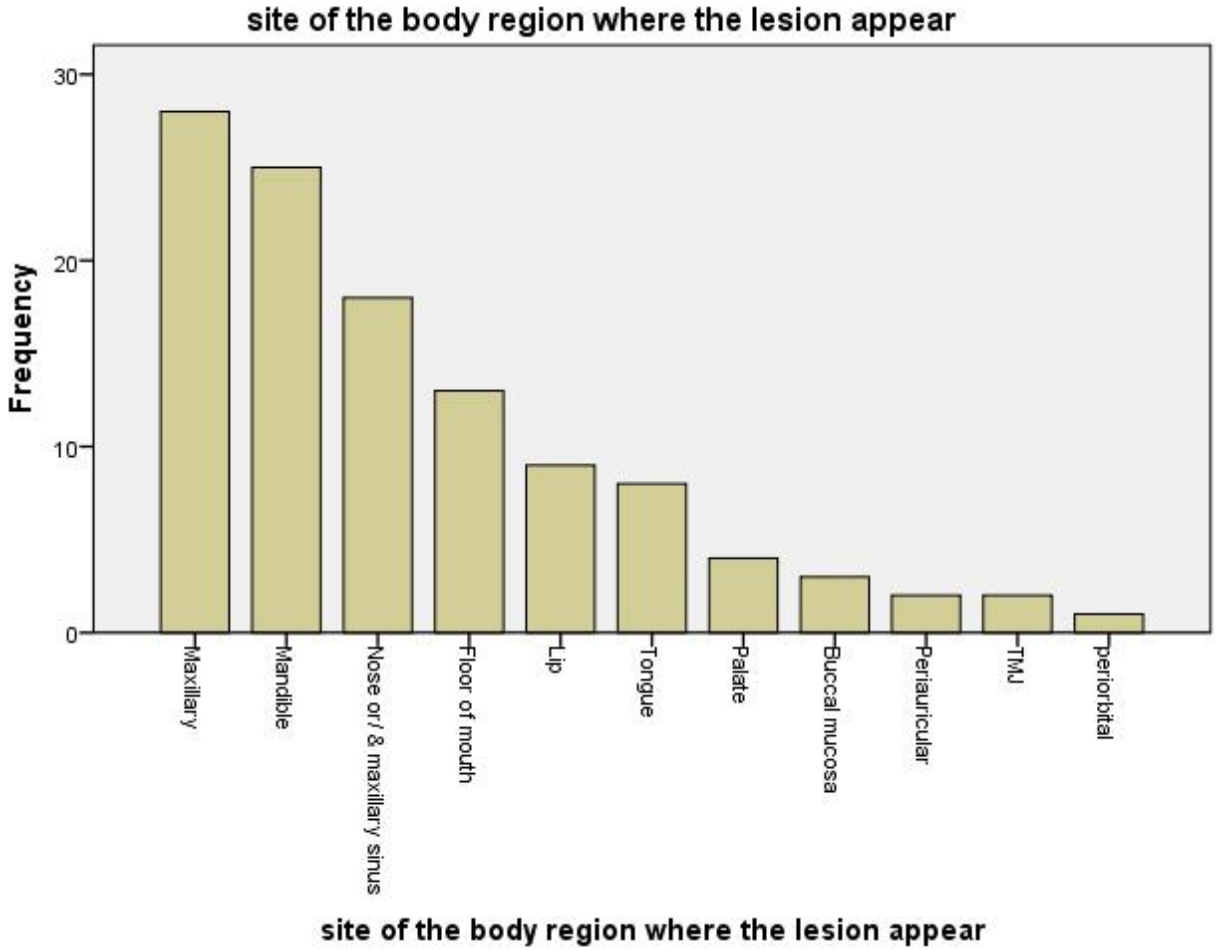

Figure 1:Pattern of lesions in body regions.

The most common lesions were salivary gland pathology (17, 15%) and odontogenic cysts (16, 14.2%). The least frequent lesions were TMJ lesion and congenital pathology each accounted only 2 cases (1.8%) (*Table 3)*. In the category of salivary gland disease, the most prevalent lesions were mucosele (9, 8%) and ranula (7, 6.2%) and dentigerous cysts (8, 7.1%) was commonest from odontogenic cyst group. In addition, hemangioma (7, 6.2%), and nasal polyp (7, 6.2%) were others prevalent lesions (*table 3*). Five cases of odontogenic tumors was found with particular histologic diagnosis of 2 cases of ameloblastoma and ameloblastic fibroma, odontoma, and AOT (table 3).

Ossifying fibroma (4) constituted the majority of non-odontogenic bone cases and ABC and fibrous dysplasia were accounted the least which was 1 case of each (*table 3*)

Vascular anomalies accounted for 11 cases with diagnose of hemangioma of 7 cases which was found on lip, tongue and mandible and vascular malformation common on lip (*table 3 & 4*)

Table 3: Lesions category and specific histologic diagnosis among male and female pediatric

		Gender of the patient		
		male	female	Total
Others	Schwannoma	0	1	1
	Neurofibroma	1	1	2
	JNA	1	0	1
	Ankylosis	1	1	2
	Antrochoanal polyp	5	0	5
	Nasal polyp	5	2	7
	papilloma	1	1	2
	Fibroma	1	3	4
	Ankyloglossia	1	0	1
	Congenital granular cell tumor	0	1	1
	Fibromatous epulis	1	0	1
	Total	17	10	27
Vascular anomalies	Vascular malformation	2	2	4
	Hemangioma	2	5	7
	Total	4	7	11
Nonodontogenic cyst	Nasopalatine cyst	1	1	2
	Dermoid cyst	3	1	4
	epidermoid cyst	1	0	1
	Sebaceous cyst	1	0	1
	Total	6	2	8
Reactive Hyperplasia	Pyogenic granuloma	2	1	3
	PGCG	1	2	3
	Eosinophilic granuloma	1	0	1
	Adenoid hyperplasia	1	0	1
	Total	5	3	8
Malignant pathology	pPNET	0	1	1
	SCC	0	1	1
	Osteosarcoma	1	1	2
	Rhabdosarcoma	2	1	3
	Hemangiopericytoma	1	0	1
	Total	4	4	8
Salivary gland pathology	mucocele	6	3	9
	Ranula	4	3	7
	Pleomorphic adenoma	0	1	1
	Total	10	7	17
Nonodontogenic bone pathology	Ossifying fibroma	1	3	4
	Juvenile ossifying fibroma	1	1	2
	ABC	0	1	1
	CGCT	2	0	2
	cherubism	2	0	2
	Fibrous dysplasia	1	0	1
	7.000	1	0	1
	Total	8	5	13
Odontogenic tumors	Ameloblastic fibroma	0	1	1
	Ameloblastoma	2	0	2
	Complex odontoma	1	0	1
	AOT	1	0	1
	Total	4	1	5
Odontogenic cyst	Dentigerous cyst	6	2	8
	COC	2	0	2
	Lateral periodontal cyst	1	0	1
	Eruption cyst	3	0	3
	Radicular cyst	0	1	1
	OKC	0	1	1
	Total	12	4	16
Total		70	43	113

Table 4: Histological diagnosis and its anatomic locations.

histologic diagnosis of the lesion	site of the body region where the lesion appear											
	Palate	Mandible	Maxillary	Tongue	Per auricular	Lip	Nose or/ & sinus	Buccal mucosa	Floor of mouth	periorbital	TMJ	Total
Dentigerous cyst	-	-	8	-	-	-	-	-	-	-	-	8
Mucosele	-	-	-	3	-	3	1	1	1	-	-	9
Vascular malformation	-	-	-	-	-	3	-	1	-	-	-	4
COC	-	2	-	-	-	-	-	-	-	-	-	2
Ossifying fibroma	-	1	1	-	-	-	-	-	-	-	-	2
Hemangiopericytoma	-	-	-	-	-	-	1	-	-	-	-	1
Juvenile ossifying fibroma	-	-	2	-	-	-	-	-	-	-	-	2
OKC	-	1	-	-	-	-	-	-	-	-	-	1
ABC	-	1	-	_	_	_	_	_	_	_	_	1
JNA	-	-	-	-	-	-	1	-	-	-	-	1
Congenital granular cell tumor	-	-	1	-	-	-	-	-	-	-	-	1
Ankylosis	-	-	-	-	-	-	-	-	-	-	2	2
Dermoid cyst	-	-	-	-	-	-	-	-	4	-	-	4
Ranula	-	-	-	-	-	-	-	-	7	-	-	7
Nasopalatine cyst	-	-	2	-	-	-	-	-	-	-	-	2
pPNET	-	1	-	-	-	-	-	-	-	-	-	1
CGCT	-	1	1	-	-	-	-	-	-	-	-	2
Osteosarcoma	-	1	1	-	-	-	-	-	-	-	-	2
Pyogenic granuloma	-	1	2	-	-	-	-	-	-	-	-	3
SCC	-	-	1	-	-	-	-	-	-	-	-	1
Lateral periodontal cyst	-	-	1	-	-	-	-	-	-	-	-	1
Ameloblastic fibroma	-	1	-	-	-	-	-	-	-	-	-	1
Antrochoanal polyp	-	-	-	-	-	-	5	-	-	-	-	5
Ameloblastoma	-	2	-	-	-	-	-	-	-	-	-	2
Cherubism	-	2	-	-	-	-	-	-	-	-	-	2
Nasal polyp	-	-	-	-	-	-	7	-	-	-	-	7
Epidermal cyst	-	-	-	-	-	-	-	-	-	1	-	1
Papilloma	1	-	-	1	-	-	-	-	-	-	-	2
Hemangioma	-	2	-	2	-	3	-	-	-	-	-	7
Fibroma	1	-	1	1	-	-	-	1	-	-	-	4
Eruption cyst	-	1	2	-	-	-	-	-	-	-	-	3
Complex odontoma	-	1	-	-	-	-	-	-	-	-	-	1
PGCG	-	2	1	-	-	-	-	-	-	-	-	3
Neurofibroma	-	2	-	-	-	-	-	-	-	-	-	2
Sebaceous cyst	-	-	-	-	1	-	-	-	-	-	-	1
Schwannoma	-	-	-	-	1	-	-	-	-	-	-	1
Rhabdomyosarcoma	-	-	-	-	-	-	3	-	-	-	-	3
Ankyloglossia	-	-	-	-	-	-	-	-	1	-	-	1
Ossifying fibroma	-	2	-	-	-	-	-	-	-	-	-	2
AOT	-	-	1	-	-	-	-	-	-	-	-	1
Congenital granular cell tumor	-	-	1	-	-	-	-	-	-	-	-	1
Eosinophlic granuloma	-	-	-	1	-	-	-	-	-	-	-	1
Radicular cyst	-	-	1	-	-	-	-	-	-	-	-	1
Fibrous dysplasia	-	-	1	-	-	-	-	-	-	-	-	1
Adenoid hypertrophy	1	-	-	-	-	-	-	-	-	-	-	1
Pleomorphic adenoma	1	-	-	-	-	-	-	-	-	-	-	1
Fibromatous epulis	-	-	1	-	-	-	-	-	-	-	-	1
Total	4	25	28	8	2	9	18	3	13	1	2	113

CHAPTER SIX

Discussion

Pediatric oral and maxillofacial lesions represent a heterogeneous group of pathological conditions, ranging from true neoplasms to congenital disorders and hamartomas (1).

There are variation in male and female ratio of pediatric maxillofacial lesions in previous different studies. In this study males pediatric patients are predominant similar to study found in Australia and Persian populations (3, 8).

One of the most important variables in almost all study concerning pediatric patients is age. It is difficult to determine the age interval, in which pediatric oral and maxillofacial lesions occur most frequently because of the different age ranges used in different studies. Some studies recruited children up to 15 years of age, whereas others accepted older children in to their studies and grouped in different age range (1, 3, and 6). In this study, the patients were categorized into four age groups, 0-4 years old, 5-8 years old, 9-12 years old and 13-16 years old (10).

An increase in occurrence of lesions were observed with increasing age group. Most pediatric lesions were observed in the oldest age group (from 12.4% in the 0-4 year's group to 40.7% in the 13-16 year's age groups). Lesions occurred mostly within the 13-16 years group category similar to other studies (10, 16).

In the present study, maxilla was found to be more affected than mandible but maxilla is the most common site reported as study in Brazil and Nigeria (4, 9). As suggested in previous literature, this difference in the distribution of lesions in children may probably be attributed to the state of dynamism of dent alveolar complex.

The current study was found the trend of pediatric maxillofacial lesion to be predominated by salivary gland lesions with most common diagnosis of mucocele (9, 8%) and odontogenic cyst specifically dentigerous cyst (8, 7.1%)of all lesions. These results are comparable to study from Southern Taiwan, Brazil and Rio de Janeiro (4, 6, and 10). Eruption cyst is credited 3 cases (2.7%) of all lesions which is considered as dentigerous cyst in soft tissue in 2017 WHO classification of odontogenic cyst (14). By this study OKC was accounted only 1 cases. The reason may probably the occurrence of OKC is reportedly around the second or third decade commonly.

Five cases of dontogenic tumor was encountered in this study. Two cases of ameloblastoma are noted followed by ameloblastic fibroma, complex odontoma and AOT each with 1 case. This is similar to study done in Nigeria (8) but most literature reported as odontoma is the common odontogenic tumor in pediatric (4, 6, 7). This may be due to sample size difference.

Among the nonodontogenic bone tumors, ossifying fibroma (4 cases) was the most common and the fibrous dysplasia (1 case) accounted the least. As study in Africa Nigeria fibrous dysplasia was accounted 5.2% which is common than and ossifying fibroma (4.6%). This is likely due to fibrous dysplasia is commonly seen in the second and third decades of life and the present study included only pediatrics 16 years and below may be one reason for lesser number of fibrous dysplasia cases reported in this study.

Of all the 113 cases included in the study, only 8 cases (7.1%) were malignant; implying a low rate of malignancy in children. The malignant lesions in this study was common in 9-16 years range. This finding is comparable with study value in Nigeria (6%) (10). But this trend is markedly higher than the study reported in Brazil (1.3%) and Platos Brazil (1.2%) (4, 5). This may be related to late presentation due to financial constraints or knowledge gaps in our cases.

The two common malignant lesions in this study were rhabdomyosarcoma (3 cases) and osteosarcoma (2 cases) this is similar to finding in Brazil and Tanzania (4, 6). Most of malignant lesions was common in late ages of pediatric this is may be chances of neoplastic changes to occur are likely in this period of growth.

Eight cases of Hemangioma was accounted in this study which is comparable with study done in Tanzania (6) and vascular malformations 4 cases and were common in lip.
Trend of others lesions, antrochoanal polyp and nasal polyp were the most common lesion. Fibroma was the second most common lesions reviewed 4 cases (3.5%) among all lesions which was common late age groups. This is similar to finding in Southern Taiwan (7). Neurofibroma was found in 2 cases of this study. Other rare lesion in literature which was encountered in 1 case of this study is congenital granular cell tumor in 1 day old female neonates.

CHAPTER SEVEN

Conclusion and Recommendation

It is important to note that the overall and relative rate of occurrence of individual pediatric oral lesions differ from region to region. The difference in reported frequency could be due to geographic or ethnic differences or economic status although it remains to be proved. So more studies are required to contribute additional data. In the this study mucocele, dentigerous cyst, hemangioma, ranula, nasal polyp, antrochoanal polyp, ossifying fibroma were the most common lesions among the benign lesions while rhabdomyosarcoma was the most common malignant lesion followed by osteosarcoma. Maxilla was the most affected anatomic regions generally. This study investigated the trend and pattern of these lesions in JUMC, Ethiopia which helps to quantify & analyze the range of maxillofacial pathology in pediatric population. In addition it assist as a point for a much needed population based study.

Recommendation of this study going to maxillofacial surgery department to have logbook with full information of patients includes registration number, age, sex, histologic diagnosis, anatomic sites of lesions, treatment delivered and prognosis of lesion and especially registering histologic diagnosis and treatment prognosis, radiographic and intraoperative finding on chart of patient which surely Help in further extended study of this issue.

CHAPTER EIGHT

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Annexes

Annex I: Data collection format

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Data Collection Format for research on trend and pattern of oral and maxillofacial pathologies among pediatric patient's seen at JUMC during September 2015 to August 2019

Data was collected through medical record reviews of patients using a prepared data extraction format on, socio-demographic, histologic diagnosis, sites of lesions. Data was collected over a 21 days period by 4 general dentist being supervised by 2 maxillofacial residents. Identification of disease was done by using biopsy result/histopathologic diagnoses or typical clinical or radiographic feature documented in patient's chart.

Data collector

Supervisor

S.No		Code
1	Age (yrs.)_____ Sex ----------	
2	Card No ---------- Area of Residency----------	
3	DATE of registry/diagnosis dd/mm/yy/ ----------	
4	Evaluating department----------	
5	Site of lesion---------- duration of lesion ----------	
6	Size of lesion ……..	
7	Clinical diagnosis----------Histologic diagnosis----------	
9	Procedure/treatment done ----------	
10	Prognosis----------	

Annex II: Classifications

2017 WHO classification of odontogenic tumors and cysts

Odontogenic Tumors	
Benign Odontogenic Tumors	**Malignant Odontogenic Tumors**
Epithelial Origin Ameloblastoma, conventional Ameloblastoma, unicystic type Ameloblastoma, extraosseous/ peripheral type Metastasizing (malignant) ameloblastoma Squamous odontogenic tumor Calcifying epithelial odontogenic tumor Adenomatoid odontogenic tumor **Mixed (Epithelial-Mesenchymal) Origin** Ameloblastic fibroma Primordial odontogenic tumor Odontoma Compound type Complex type Dentinogenic ghost cell tumor **Mesenchymal Origin** Odontogenic fibroma Odontogenic myxoma/myxofibroma Cementoblastoma Cemento-ossifying fibroma	Ameloblastic carcinoma Primary intraosseous carcinoma, NOS Sclerosing odontogenic carcinoma Clear cell odontogenic carcinoma Ghost cell odontogenic carcinoma Odontogenic carcinosarcoma Odontogenic sarcomas

Odontogenic Cysts	
Developmental Origin Dentigerous cyst Odontogenic keratocyst Lateral periodontal and botryoid odontogenic cyst Gingival cyst Glandular odontogenic cyst Calcifying odontogenic cyst Orthokeratinized odontogenic cyst	**Inflammatory Origin** Radicular cyst Collateral inflammatory cyst

Annex II: WHO classification of odontogenic tumors & cyst and salivary gland disease

Nonodontogenic Cysts

Nasopalatine Duct Cyst (Incisive Canal Cyst)

Nasolabial Cyst

Thyroglossal Tract Cyst

Branchial Cyst

Epidermoid Cyst/Sebaceous Cyst

Epidermal Inclusion Cyst

Dermoid Cyst

Teratoid Cyst (Teratoma)

Heterotopic Gastrointestinal Cyst

WHO Classification of Salivary Gland Tumors 2017

Malignant tumors

Acinic cell carcinoma

Secretory carcinoma

Adenoid cystic carcinoma

Polymorphous adenocarcinoma

Clear cell carcinoma

Basal cell adenocarcinoma

Sebaceous adenocarcinoma

Intraductal carcinoma

Cystadenocarcinoma

Adenocarcinoma, NOS

Salivary duct carcinoma

Myoepithelial carcinoma

Carcinoma ex pleomorphic adenoma

Carcinosarcoma

Poorly differentiated carcinoma

Neuroendocrine and non-neuroendocrine

Undifferentiated carcinoma

Large cell neuroendocrine carcinoma

Small cell neuroendocrine carcinoma

Lymphoepithelial carcinoma

Squamous cell carcinoma

Oncocytic carcinoma

Borderline tumor

Sialoblastoma

Benign tumors

Pleomorphic adenoma

Myoepithelioma

Basal cell adenoma

Warthin tumor

Oncocyoma

Lymphadenoma

Cystadenoma

Sialadenoma papilliferum

Ductal papilloma

Sebaceous adenoma

Canalicular adenoma and other ductal adenomas

Other epithelial lesions

Sclerosing polycystic adenosis

Nodular oncocytic hyperplasia

Lymphoepithelial lesions

Intercalated duct hyperplasia

Soft tissue lesions

Haemangioma

Lipoma/sialolipoma

Nodular fasciitis

Haematolymphoid tumors

Extranodal marginal zone lymphoma of MALT