

## RESEARCH ARTICLE

# Clinicopathological Evaluation of Odontogenic Tumours in Pakistan - A Seven Years Retrospective Study

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### Abstract

**Background:** The purpose of the study was to analyse the clinicopathological spectrum of benign and malignant odontogenic tumours (OT) in Pakistan. **Materials and Methods:** This retrospective study was carried out at the Armed Forces Institute of Pathology (AFIP) Rawalpindi. Seven years archival records of histologically diagnosed odontogenic tumours, both benign and malignant, were collected and the lesions re-diagnosed histologically in accordance with the WHO classification of head and neck tumours (2005). Clinical as well as histological data were analysed and frequency of each type of OT was calculated using computer software programme SPSS (version 17). Mean tumour size was calculated and Chi-square test was applied to find associations of age, gender and site with each histological type of tumour. **Results:** Only 1.7% of the odontogenic tumours diagnosed in this said period were malignant while the remaining 98.3% were benign. Amongst benign lesions, ameloblastoma was the most common (61.3%) type while primary intraosseous squamous cell carcinoma (1.7%) was the only reported malignant tumour. Mean age of the affected patients was  $31.7 \pm 16.7$  years with posterior mandible as the commonest site involved. **Conclusions:** Our study revealed ameloblastoma and primary intraosseous squamous cell carcinoma as the commonest diagnosed benign and malignant tumours respectively. There was a significant difference in age and site of origin of different types of OT at the time of their presentation. However, all the tumours showed male predominance.

**Keywords:** Odontogenic tumours - ameloblastoma - primary intraosseous squamous cell carcinoma

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### Introduction

Odontogenic tumours (OT) constitute a heterogeneous and diverse group of pathologies primarily limited to mandible or maxilla. They arise either from epithelial or ectomesenchymal tissues or both; parts of the tooth forming tissue (Barnes et al., 2005). Their reported frequency in different populations of the world varies, ranging from 1% to 9.6% of all tumours of the jaw (Ladeinde et al., 2005; Sriram and Shetty, 2008; Luo and Li, 2009; Saghravonian et al., 2010). According to the most recent WHO (World Health Organization) classification of 2005, odontogenic keratocyst is considered as a benign cystic neoplasm known as Keratocystic Odontogenic Tumour (KCOT) (Barnes et al., 2005). Although numerous studies have been conducted on various populations of the world to see their relative frequencies (Buchner et al., 2006; Bhawna and Ponniah, 2010; Saghravonian et al., 2010; Tawfik and Zyada, 2010) but none could be traced that reveals its frequency in our region. The current study therefore was planned to analyse clinicopathological spectrum of odontogenic tumours, both benign and malignant in

Pakistani population. Their relative frequencies were also seen in comparison with other published studies.

### Materials and Methods

This retrospective study was carried out at the Histopathology department of Armed Forces Institute of Pathology (AFIP) Rawalpindi (Pakistan). This institute receives a large number of samples from all over Pakistan, both from armed forces as well as other public/private hospitals. Seven years archival record (January 2006 to December 2012) of histologically diagnosed benign and malignant odontogenic tumours were collected and were re-diagnosed in accordance with the WHO classification of head and neck tumours of 2005 (Barnes et al., 2005). The repeated biopsy of the same patient was considered as a single case. The demographic data regarding age and gender of patient and site and size of the biopsy specimen were collected from the laboratory request forms. The clinical as well as histological data was analysed and frequency of each type of OT was calculated using computer software programme SPSS (version 17). Age

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**Table 1. Association of Age with Various Histological Types of Odontogenic Tumour**

Age in years	Histological type							Total	
	Amelo- blastoma	Odontoma	AOT	Odontogenic myxoma	Odontogenic fibroma	Ameloblastic fibroodontoma	PIOSSC		KCOT
<10	4	0	1	1	0	0	0	0	6
10-20	16	7	7	2	0	2	0	15	49
21-30	35	1	1	1	0	0	0	9	47
31-40	20	0	0	0	1	0	0	4	25
41-50	16	0	0	1	1	0	0	5	23
51-60	17	0	0	0	0	0	0	3	20
>60	5	0	0	0	0	0	3	1	9
Total	113	8	9	5	2	2	3	37	179

\*p value &lt;0.05

**Table 2. Association of Gender with Histological Types of Odontogenic Tumour**

Gender	Histological type							Total	
	Amelo- blastoma	Odontoma	AOT	Odontogenic myxoma	Odontogenic fibroma	Ameloblastic fibroodontoma	PIOSSC		KCOT
Female	43	3	5	3	1	1	0	10	66
Male	70	5	4	2	1	1	3	27	113
Total	113	8	9	5	2	2	3	37	179

\*p value &gt;0.05

**Table 3. Association of Site with Histological Types of Odontogenic Tumour**

Site of tumour	Histological type							Total	
	Amelo- blastoma	Odontoma	AOT	Odontogenic myxoma	Odontogenic fibroma	Ameloblastic fibroodontoma	PIOSSC		KCOT
Anterior mandible	15	0	0	1	0	0	0	2	18
Posterior mandible	88	5	3	1	1	2	3	27	130
Anterior maxilla	1	1	0	1	1	0	0	5	9
Posterior maxilla	9	2	6	2	0	0	0	3	22
Total	113	8	9	5	2	2	3	37	179

\*p value &lt;0.05

**Table 4. Comparison of Different Studies**

Authors	Year of publication	Population	Benign	Malignant	Most common tumour	
					Type	Percentage
Ladeinde et al.	2005	Nigerian	96.60%	3.40%	Ameloblastoma	63%
Jing et al.	2007	Chinese	97%	3%	Ameloblastoma	40.30%
Guerrisi et al.	2007	Argentina	-	-	Odontoma	50.90%
Avelar et al.	2008	Brazilian	100%	-	KCOT	30%
Sriram & Shetty	2008	Indian	98.80%	1.20%	Ameloblastoma	61.50%
Saghravanian et al.	2010	Iranian	98.20%	1.80%	Ameloblastoma	42.40%
Varkhede et al.	2011	Indian	100%	-	Ameloblstoma	40.83%
Senel et al.	2012	Turkish	93.20%	6.80%	Odontoma	41.80%
Daniela et al.	2012	Brazilian	94.50%	5.50%	KCOT	32.30%
Current study	2014	Pakistani	98.30%	1.70%	Ameloblstoma	61.30%

of patients was categorized in six consecutive decades and tumour areas in four anatomical locations; anterior and posterior mandible and maxilla. Mean of tumour size was calculated and Chi-square test was applied to find associations of age, gender and site of tumours with each histological type. p value of  $\leq 0.05$  was considered as significant.

## Results

A total of 179 cases diagnosed as odontogenic tumours in the mentioned period of our study at AFIP. Only 1.7% of the cases of OT were diagnosed malignant and all the rest 98.3% were benign. Amongst benign, Ameloblastoma was the most common (n=113, 61.3%) histological type and the rest followed the order: Keratocystic Odontogenic tumour (n=37, 20.7%), Adenomatoid odontogenic

tumours (AOT) (n=9, 5%), Odontoma both compound and complex (n=8, 4.5%), Odontogenic myxoma (n=5, 2.8%) and 2 (1.1%) cases each of Odontogenic Fibroma and Ameloblastic fibroodontoma. All the 3 cases of malignant type were diagnosed as Primary Intraosseous Squamous Cell Carcinoma (PIOSSC).

The ages of the affected patients ranged from 7 to 77 years (mean  $31.74 \pm 16.74$ ); this association of age with each histological type is given in Table 1. Males were affected comparatively more than females (1.7: 1) which was seen in almost all histological types with the exception of Adenomatoid Odontogenic Tumour (AOT) and Odontogenic myxoma that prevailed more in females (Table 2). Posterior mandible was the commonest site of origin (72.6%) by all the types of OTs that followed posterior maxilla (Table 3) and their sizes ranged from 0.5cm to 12.5cm (mean  $3.74 \pm 2.64$ ).

## Discussion

Odontogenic tumours constitute an important aspect of jaw pathology that shows variation of frequency in different populations of the world. This first study in Pakistan describes their relative frequency in our population and their clinicopathological spectrum in comparison with other studies conducted on various populations of the world. Practically it was impossible to collect data of all the oral lesions from archival records of the institute and analyse their individual frequency, hence, only relative frequency of odontogenic tumours was determined. This study included a large number of cases of odontogenic tumours diagnosed over a period of 7 years that helped us to find some interesting differences in our setup.

As mentioned earlier, benign odontogenic tumours were found to be far more common (98.3%) than their malignant counterpart and ameloblastoma was the most prevalent amongst them. Our this finding is in consistent with other published studies from Nigeria, India, Iran and Egypt (Ladeinde et al., 2005; Sriram and Shetty, 2008; Saghavanian et al., 2010; Tawfik and Zyada, 2010) but is contrary to the results of studies from America and Brazil where Odontoma was seen the most common histological type (Buchner et al., 2006; Lima et al., 2008). Similarly in studies conducted on Libyan and Brazillian population showed KCOT to be the most common type (El-Gehani et al., 2009, Daniela et al., 2012). Likewise it was also reported the commonest OT in Chinese population (Luo and Li, 2009). This difference in frequencies of these lesions between developing and developed countries might be the result of better health education and facilities in the developed nations; odontoma being asymptomatic lesions are usually diagnosed on radiographic examinations. In developing countries like ours where masses lack both health education and facilities, most of the people do not visit dentists without any problem / symptom.

In our study none of the tumour was found below 7 years of age with only 3.3% occurrence in 1st decade of life. This supported the fact that most of the OT arises after crown formation that completes at 4 to 5 years of age. Our this finding matches with an Indian study conducted by Verkheda et al. (2011) who also reported all these tumours in above 5 years of age. The mean age of patients suffering from these tumours was 31.7 years and majority of them (53.6%) reported in their 2<sup>nd</sup> and 3<sup>rd</sup> decades of life. We also noticed a male predominance (63.1%) with posterior mandible (72.6%) to be the commonest site involved.

Most of the cases of Ameloblastomas (48.6%) in current study were found in their 3<sup>rd</sup> and 4<sup>th</sup> decades and showed male dominance (61.9%). Majority of them involved posterior mandible (77.8%). One case that presented at floor of the mouth was considered in anterior mandible site. This finding is similar to data published in India (Varkhede et al., 2010; 2011) but in contrast with Turkish population where it was seen mostly in 6<sup>th</sup> decade of life (Senel et al., 2012). Although ameloblastoma in our setup showed a marked predilection for mandible (91%), that was consistent to Malaysian population where

it most commonly presents in mandible (91.5%) (Siar et al., 2011).

KCOT; the second most commonly occurring odontogenic tumour in this study was found to be prevalent in 2<sup>nd</sup> and 3<sup>rd</sup> decades (64.8% cases) of life. It also showed predominance for males (72.9%) and a marked predilection for posterior mandible (72.9%). These findings for KCOT match well with a study conducted on Japanese population (Gonzalez-Alva et al., 2008). Contrarily a Brazilian study by Avelar et al. (2008) stated its prevalence in 3<sup>rd</sup> and 4<sup>th</sup> decades, dominance for females and involvement for mandibular region mainly. We observed that majority of the cases of Odontoma and AOT reported in the 2<sup>nd</sup> decade and commonly involved posterior mandible and posterior maxilla respectively. Our finding is consistent with a Nigerian study by Ladeinde et al. (2005).

The mean size of all these OT at the time of presentation was 3.74±2.64cm with Ameloblastoma (4.31±2.88cm) and AOT (4.36±2.05cm) to be the largest. This showed a slight variation when compared to a Brazilian study where AOT presented with a mean of 2.4cm (De Matos et al., 2012).

PIOSCC was the only malignant tumour found in our study with a frequency of 1.7%. Comparatively it was seen less in Turkish population (1.1%) as mentioned by Olgaca et al. (2006). It was found more in males of over 60 years of age with predilection for posterior mandible which suggested that malignant OTs are rarely reported in younger people of our setup. The frequency of rest of these tumours was too small to discuss. We also noticed a significant association of age and site of origin with each histologic type that remained insignificant as far as gender was concerned.

Although cases of calcifying epithelial odontogenic tumour were reported in majority of the studies conducted on other populations (Ladeinde et al., 2005; Guerrisi et al., 2007; Gonzalez-Alva et al., 2008; Saghavanian et al., 2010) but not a single case of it was noticed in the mentioned period of our study.

In conclusion, our study clearly reflects a difference of age and site of origin in different types of OT at the time of their presentation. However, we noticed no specific gender difference between them. Benign odontogenic tumours are much more common than their malignant counterparts with peak prevalence in 3<sup>rd</sup> decade and male to female ratio of 1.7:1. Posterior mandible was the commonest site involved. Ameloblastoma and primary intraosseous squamous cell carcinoma were the most common diagnosed benign and malignant tumours respectively.

Being the first study on prevalence and demography of OT in Pakistani population, it can be helpful for the clinicians in making diagnosis. It will also serve as a baseline reference assisting in future designing of research proposals.

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