

Prevalence of Odontogenic Tumours in a Dental Hospital in Southern India

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Abstract

Odontogenic Tumours (OTs) pose as a heterogenous group of lesions exhibiting diverse clinical behaviour and histopathological types which can range from hamartomatous lesions to malignancies. Although a large number of studies have been done to record the epidemiology of odontogenic tumours, there is a paucity of information where its prevalence is concerned in South Indian cities. Thus, the aim of our study is to highlight the prevalence of various types of odontogenic tumours in a predominantly South Indian hospital set up so as to improve clinical understanding and handling of patients with said tumours. A retrospective cross-sectional study was conducted after reviewing and analysing the data from patient records over the last five years. Patients with histopathologically established odontogenic tumours were selected without any age restriction. The data was collected and descriptive statistics were performed. The findings of our study hinted at a benign odontogenic prevalence with a male predilection (68.6%). The posterior region of the mandible was the most commonly involved site (60%) and ameloblastomas followed by odontomas and adenomatoid odontogenic tumours were the most prevalent odontogenic tumours in our hospital set up. An asymptomatic trend with multilocular radiolucencies was evidently observed. Through the results of our study, we hope to elucidate the prevalence of odontogenic tumours in the South Indian population. In essence our findings suggest a male predilection in the posterior region of the mandible and that Ameloblastomas and Odontomas are the most common odontogenic tumours. Due to the large number of asymptomatic presentations, proper diagnosis and management is key. Thus, further studies need to be done to overcome the limitations of our study and to confirm our findings.

Keywords: *Odontogenic Tumours; Follicular Ameloblastoma; Unicystic Ameloblastoma; South India.*

Introduction

Odontogenic Tumours are heterogeneous lesions that are derived from epithelial or ectomesenchymal tissues or sometimes, both. They can range from

hamartomatous lesions to malignancies and exhibit a plethora of clinical behaviours and histopathological types¹⁻³. They can either be found within the jaw bones (central type) or in the mucosal tissue that overlies the tooth bearing areas (peripheral types). Although the etiology is unknown OTs can be primarily classified into malignant and benign tumours. The majority of benign tumours seem to arise de novo, whereas in malignant tumours they may arise de novo but they more commonly arise from their benign precursor. Essentially, the classification of odontogenic tumours is based on its interactions between the epithelium and the odontogenic ectomesenchyme. But this classification is constantly under debate so it is frequently met with new additions and the removal of existing entities.^{4,5} Ameloblastomas

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in general are common (among OTs), benign tumours of the odontogenic epithelium that more often occur in the mandible than the maxilla. Although they are rarely metastatic and progress very slowly, the lesions cause severe disfigurement of the face and the jaw.⁶⁻¹⁵ Odontomas are benign tumours associated with tooth development¹⁶⁻²⁴. It is a dental hamartoma indicating that it is composed of normal dental tissue but has grown in an abnormal manner. It is of type types – compound and complex.²⁵⁻²⁹ Adenomatoid Odontogenic Tumours (AOTs) arise from the enamel organ or the dental lamina.³⁰ Nearly two by third of its cases are associated with an impacted canine.^{31,32} It is fairly uncommon and is seen mostly in younger people with a female predilection.³³ Odontogenic Myxomas are uncommon benign tumours arising from embryonic connective tissues associated with tooth formation. It mainly consists of spindle shaped cells and scattered collagen fibres, distributed in a loose mucoid material. As the tumour expands it has been known to infiltrate adjacent structures like sinuses in the case of maxillary tumours and the ramus in the case of mandibular tumours.³⁴⁻³⁷ Odontogenic Fibromas are slow growing, uncommon gingival masses. It can sometimes cause tooth displacement and has no particular gender predilection.³⁸⁻⁴¹ Ameloblastic carcinoma is a rare tumour that develops in the jaw bones from enamel forming epithelial cells.^{42,43} It can cause painful swellings that only progresses, with no response to chemotherapy. Although some patients may even be asymptomatic, some rare symptoms include trismus, dysphonia and voice loss.⁴⁴⁻⁴⁶ As tumours always pose a threat to a person's wellbeing, our study aims to enumerate its prevalence and to analyse any gender, site, radiographic or clinical presentation predilection.

There is a marked difference in the patterns of incidence as reported by several individuals attempting to study the epidemiology of odontogenic tumours. Thus, our study is engineered to notice any difference in prevalence trends in recent years as compared to older documentations and to elucidate the presence of variations amongst different geographical locations and ethnicities in regard to the prevalence of different types of odontogenic tumours.

Materials and Methods

Study Design and Setting

This retrospective study reviewed the records of patients who visited the hospital over the last five years to undergo various treatments at Saveetha Dental College, Chennai. Ethical approval was obtained from the Institutional Ethics Committee. The study population included patients with histopathologically established odontogenic tumours with no age restrictions. They were separated according to their sex, type of tumour, site, recurrence, clinical and radiographic presentations. Mentally or physically disabled individuals were excluded from the study due to their potential difficulties faced during participation.

Data Collection

The records of patients who visited Saveetha Dental College in the last five years were analysed and were used to identify 35 patients in the hospital database undergoing various treatments, but with histopathologically established odontogenic tumours. Relevant data such as patient age, sex, site, type of tumour, history of recurrence, clinical and radiographic presentation were obtained from their general examination, clinical examination, personal details and histopathological reports and was recorded. Repeated patient records and incomplete entries were excluded. The data obtained was then verified by an external reviewer.

Statistical Analysis

Data was recorded in Microsoft Excel 2016 (Microsoft Office 10) and was later exported to the Statistical Package for the Social Sciences for Windows. (Version 20.0, SPSS, Inc., Chicago, USA) and was subjected to descriptive statistical analysis.

Results and Discussion

The final dataset consisted of 35 patients of predominantly South Indian origin undergoing various treatments but with histopathologically proven odontogenic tumours among the total 1550 reported biopsy cases. The sites were grouped as the mandibular posterior region, mandibular anterior region, maxillary anterior region and 'mandible' for tumours that occurred in the premolar region or throughout the entire lower jaw. Out of these sites, the one with the highest prevalence of odontogenic tumours was the mandibular posterior region (60%) followed by the mandible (25.7%), the mandibular anterior region (11.4%) and the maxillary

anterior region with the least (2.9%) as inferred from Figure 1. Overall, the mandible was more susceptible to the prevalence of odontogenic tumours when compared to the maxilla. The mean age of the study sample was 33.09 years. According to Figure 2, the age group with the most number of established odontogenic tumours was found to be 'above the age of 40 years'. There was a clear male predilection when its incidence was considered with 68.6% as opposed to 31.4% of females. (Figure 3)

Based on the type of tumour, follicular ameloblastoma was the most common (34.3%), followed by unicystic ameloblastoma (including all types - 17.1%), plexiform ameloblastoma (14.3%), granular cell ameloblastoma (8.6%), 5.7% for both types of odontomas and adenomatoid odontogenic tumours and 2.9% being the least for proliferative ameloblastoma, odontogenic myxoma, calcifying cystic odontogenic tumour, peripheral odontogenic fibroma and ameloblastic carcinoma. (Table 1)

Recurrence was observed in 14.3% of the cases as suggested from our data in Table 2 and Figure 4. The clinical presentation was recorded under two groups – asymptomatic swellings (60%) and symptomatic swellings (17.1%) with the rest of the data not available because of the absence of its mention in the case reports. (Table 3) The radiographic presentations was recorded under four groups – multilocular radiolucency (40%), unilocular radiolucency (28.6%), unilocular with an impacted tooth (11.4%) and 2.9% of radio-opaque masses with the rest unavailable as inferred from Table 4 and Figure 5.

Thus, the most common trends observed was a male predilection; involvement of the posterior mandible; rarely recurring asymptomatic swellings radiographically presenting with multilocular radiolucencies and a tendency to occur more commonly above the age of 40 years. Ameloblastomas (follicular type) followed by odontomas and adenomatoid odontogenic tumours were the most frequently prevalent OTs.

The data for this retrospective study was based on residents of South Indian cities seeking treatment at Saveetha Dental College, Chennai. According to our results, 24 males out of 35 patients (68.6%) and 11 females out of 35 patients (31.4%) were affected

showing a predilection in favour of males in regard to the prevalence of odontogenic tumours. This is in accordance with most studies - In a study conducted by Gupta B *et al.* in 2010 sampling a similar south Indian population in the state of Tamil Nadu, it is suggested that the mandible especially the posterior part was the most commonly involved site and that ameloblastomas were the most prevalent type of odontogenic tumour (67.69%) followed by AOTs (9%) and odontomas (7.77%). Most cases were benign with only a few incidences of malignancies. This is in line with our findings, except for the fact that odontomas and AOTs were equally prevalent in our study. This could be an attribute to our difference in sample size of 35 patients as opposed to 489 cases.⁴⁷ In another study by Ezekiel *et al.* in 2002, they concluded that ameloblastomas were the most common odontogenic tumour and that tumours occurred more often in the mandible than the maxilla. There was also a gender predilection to males (57%) as opposed to females (43%). Some of the most common clinical findings were pain, swellings and loosening of teeth. There were many records of asymptomatic cases with most being benign.⁴⁸ These suggestions are in line with our findings. This could possibly be due to our comparable population sizes of 35 and 78.

In a study by Varun A.I *et al.* in 2016, they reported that the prevalence of odontogenic myxomas was around (0.04%–3.7%)⁴⁹ which is in line with our results of 2.9% for the same. In another study by Siar C.H *et al.* in 2000 they report that peripheral odontogenic fibromas account for (1.2% - 4.7%)⁵⁰ of all odontogenic tumours which is in accordance to our finding of 2.9%. In a study of 12 cases of ameloblastic carcinomas by Li J *et al.* in 2014 they concluded that ameloblastic carcinoma is a rare type of tumour, occurring only in 2.23%⁵¹ of patients which is comparable to our findings of 2.9% for the same. Since several studies over the last decade exhibit a similar pattern of incidence, there is no conclusive evidence of a change in the trends surrounding the prevalence of OTs.

Although retrospective, our study does present with certain limitations such as geographical barriers and diversity of opinions during clinical examination and radiographic interpretation. Thus, further multicentre studies must be performed to ascertain the true prevalence of the south Indian population.

Prevalence of Types of Odontogenic Tumours		
Type of Tumour	Frequency	Percentage
Follicular Ameloblastoma	12	34.3
Plexiform Ameloblastoma	5	14.3
Proliferative Ameloblastoma	1	2.9
Granular Cell Ameloblastoma	3	8.6
Unicystic Ameloblastoma Type I, Type II and Type III	6	17.1
Odontogenic Myxoma	1	2.9
Odontoma Type I and Type II	2	5.7
Calcifying Cystic Odontogenic Tumor	1	2.9
Peripheral Odontogenic Fibroma	1	2.9
Adenomatoid Odontogenic Tumor	2	5.7
Ameloblastic Carcinoma	1	2.9
Total	35	100.0

Table 1 - Table representing the frequency and percentage of prevalence of OTs based on its type with follicular ameloblastoma (34.3%) being the most common followed by unicystic ameloblastoma (17.1%). Hence ameloblastomas are the most prevalent odontogenic tumours.

Recurrence		
	Frequency	Percentage
Yes	5	14.3
No	30	85.7
Total	35	100.0

Table 2 - Table representing the frequency and percentage of prevalence of recurrence among the OTs with a statistically significant negative predilection towards recurrence (30 out of 35 patients). Hence recurrence is less common for odontogenic tumours.

Clinical Presentation		
	Frequency	Percentage
Asymptomatic Swelling	21	60.0
Symptomatic Swelling	6	17.1
NA*	8	22.9
Total	35	100.0

Table 3 - Table representing the frequency and percentage of various clinical presentations of OTs where asymptomatic presentations (60.0%) are more common when opposed to symptomatic presentations (17.1%). Hence it is more common for odontogenic tumours to go unnoticed for a long time. *Not Available

Radiographic Presentation	Frequency	Percentage
Unilocular Radiolucency	10	28.6
Unilocular with an Impacted Tooth	4	11.4
Multilocular Radiolucency	14	40.0
Radiopaque Masses	1	2.9
NA*	6	17.1
Total	35	100.0

Table 4 - Table representing the frequency and percentage of various radiographic presentations of OTs where multilocular radiolucencies (40.0%) followed by unilocular radiolucencies (28.6%) are the most frequent presentations. Hence tumours which present with multilocular radiolucencies radiographically are more likely to be commonly prevalent compared to other tumours. *Not Available

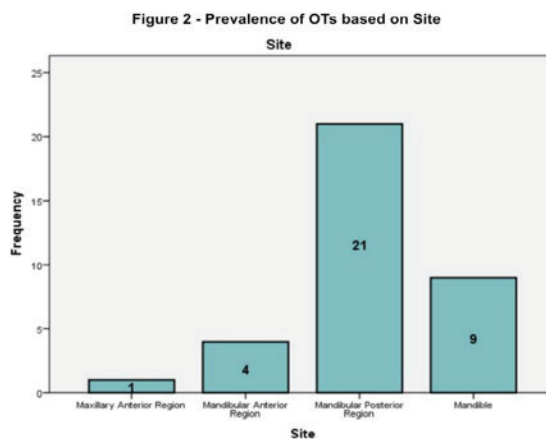


Figure 1 - Bar chart representing the prevalence of OTs based on site with a predilection towards the posterior region of the mandible with 21 out of 35 patients across the scale of study population frequency in the 'y' axis and site in the 'x' axis. Hence the most common site for odontogenic tumours is the mandibular posterior region.

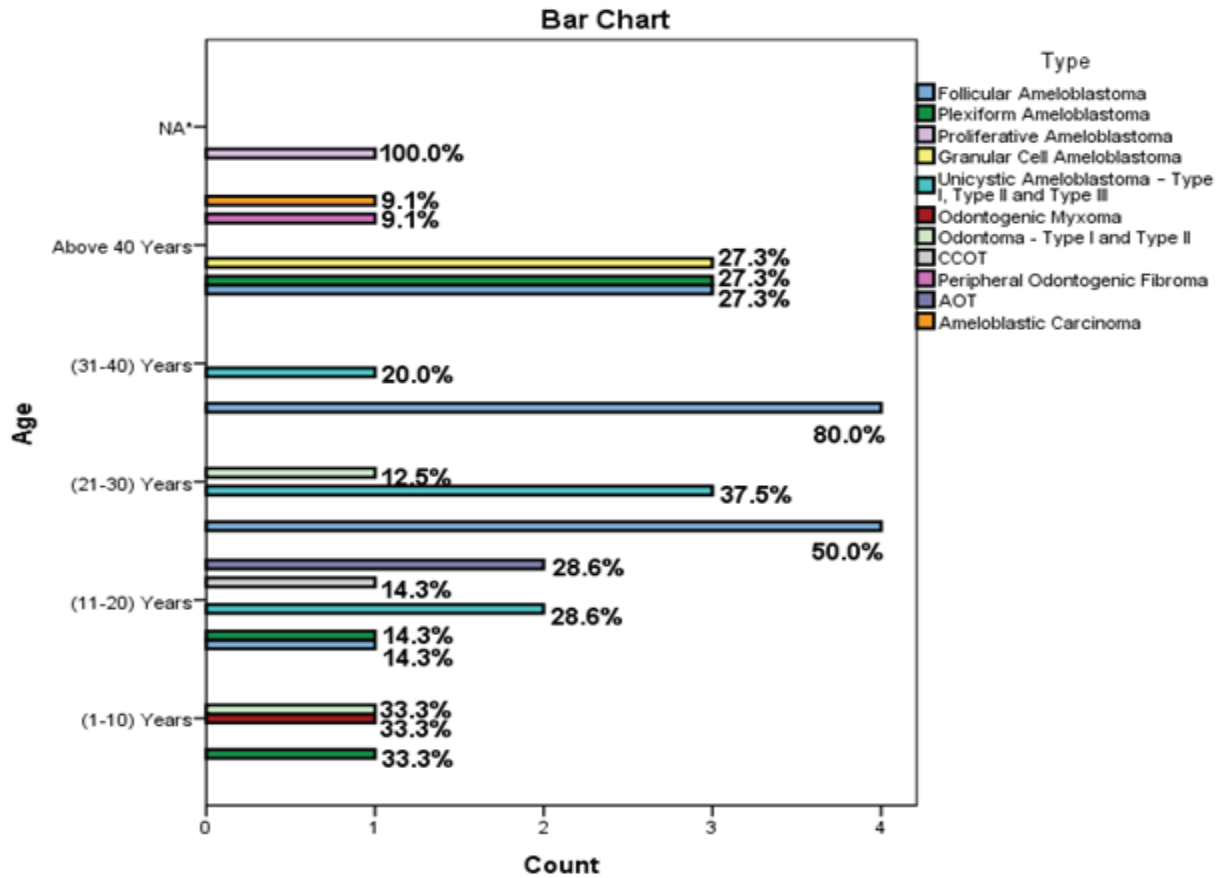


Figure 2 - Bar chart representing the association between the various types of OTs and age, showing a higher incidence of various types of OTs above the age of 40 years across the scale of study population count in the 'x' axis and the age groups of (1-10) years, (11-20) years, (21-30) years, (31-40) years and above 40 years in the 'y' axis. Here, the colour blue represents follicular ameloblastoma, dark green represents plexiform ameloblastoma, lilac represents proliferative ameloblastoma, yellow represents granular cell ameloblastoma, turquoise represents unicystic ameloblastoma (inclusive of all types), maroon represents odontogenic myxoma, pale green represents odontoma (inclusive of all types), grey represents calcifying cystic odontogenic tumors, pink represents peripheral odontogenic fibroma, violet represents adenomatoid odontogenic tumours and orange represents ameloblastic carcinoma. People above the age of 40 years are more likely to develop odontogenic tumours and this was found to be statistically significant. Chi square value, $p = 0.001$ ($p < 0.05$) *NA-Not Available

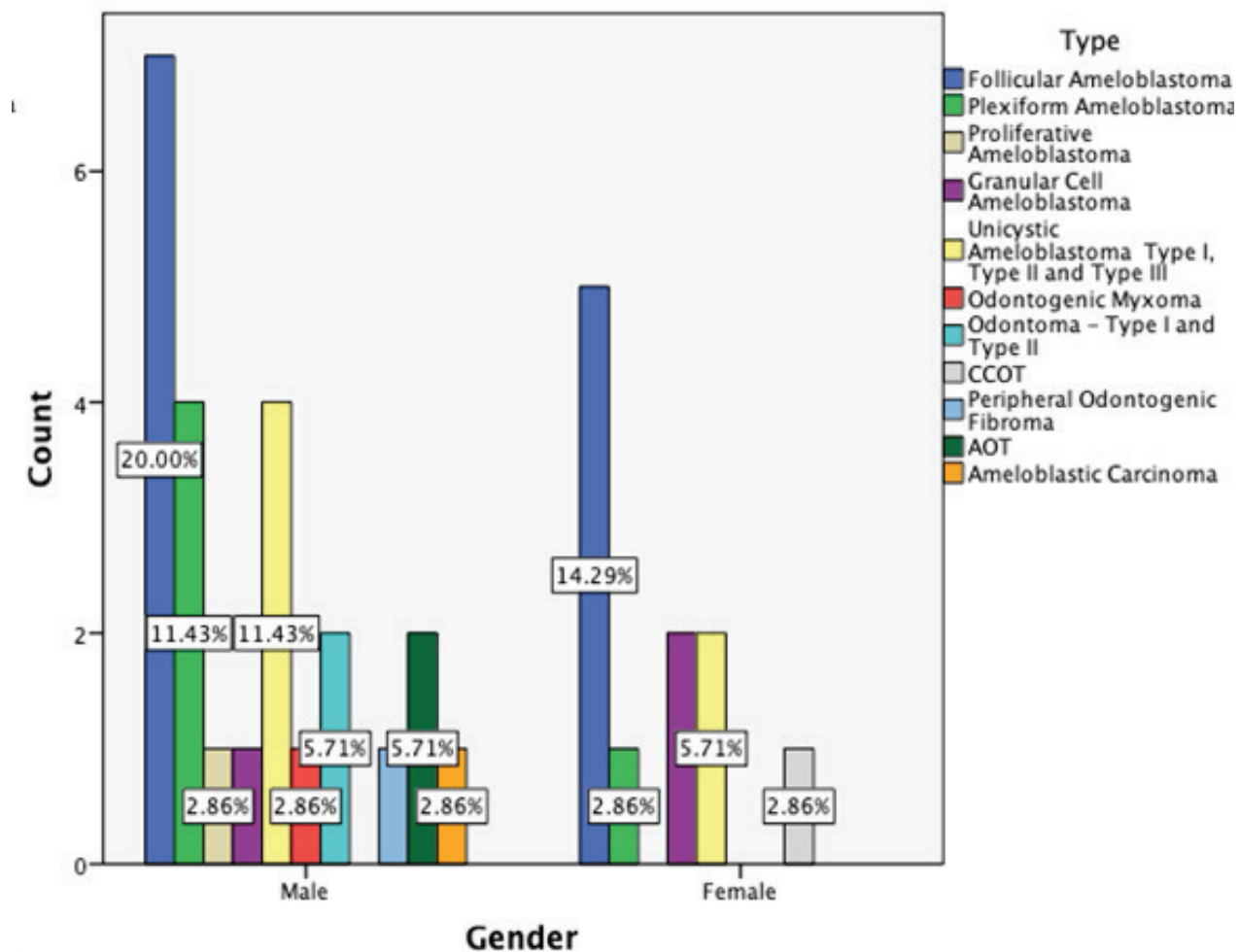


Figure 3 - Bar chart representing the association between the various types of OTs and gender where there is an existing predilection towards males across a scale of gender in the 'x' axis and study population count in the 'y' axis. Here, the colour dark blue represents follicular ameloblastoma, light green represents plexiform ameloblastoma, mustard represents proliferative ameloblastoma, purple represents granular cell ameloblastoma, yellow represents unicystic ameloblastoma (inclusive of all types), red represents odontogenic myxoma, turquoise represents odontoma (inclusive of all types), grey represents calcifying cystic odontogenic tumors, blue represents peripheral odontogenic fibroma, dark green represents adenomatoid odontogenic tumours and orange represents ameloblastic carcinoma. Males are more likely to develop odontogenic tumours than females, although this was not found to be statistically significant. Chi square value, $p = 0.583$ ($p > 0.05$)

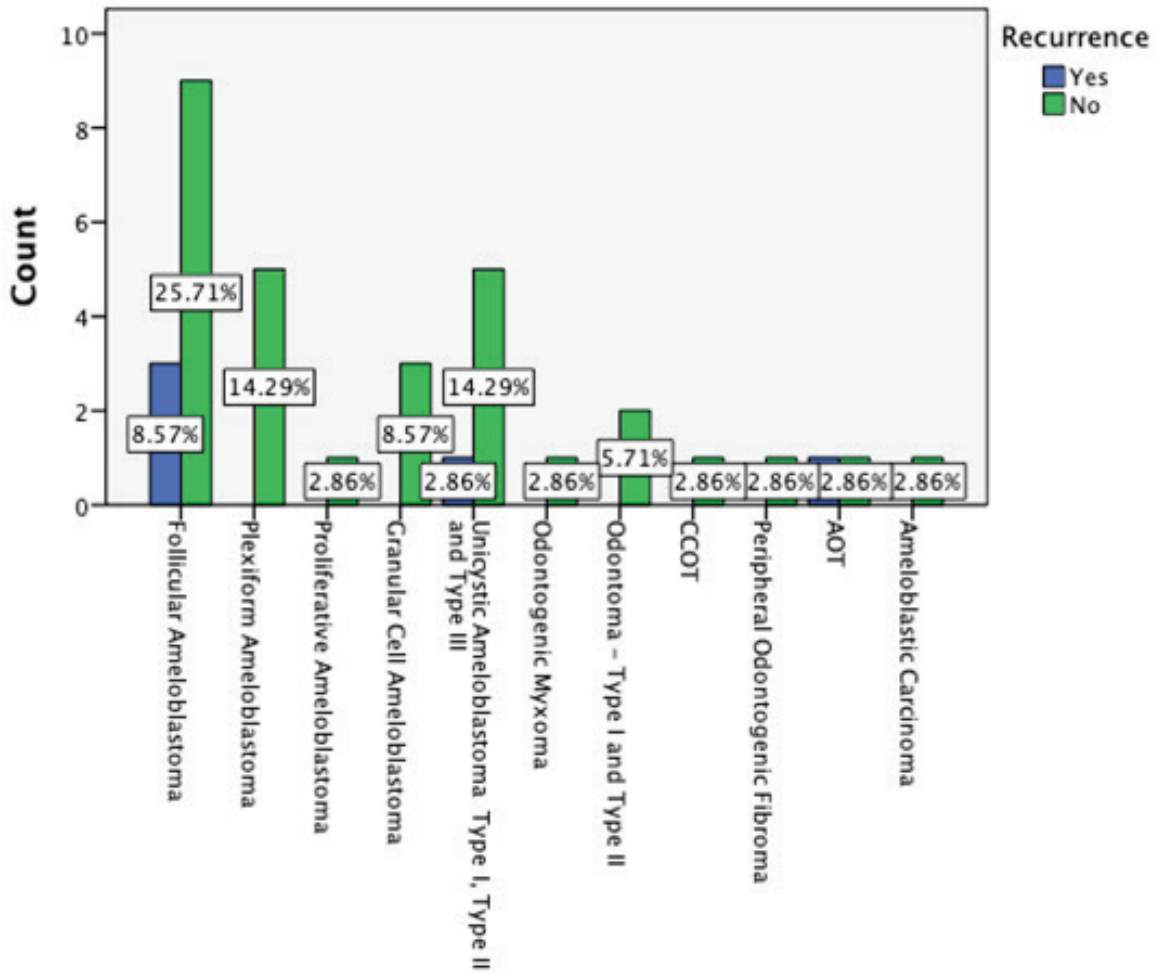


Figure 4 - Bar chart representing the association between the various types of OTs in percentage based on recurrence where there is an existing negative predilection for recurrence across a scale of type of OT in the 'x' axis and study population count in the 'y' axis. Here, the colour blue represents the presence of recurrence and green represents the absence of recurrence. Out of 11 types of odontogenic tumours, only 3 types (follicular ameloblastoma, unicystic ameloblastoma and AOT) have exhibited a history of recurrence. Follicular ameloblastoma was the most common OT to recur (8.57%), although this was not found to be statistically significant. Chi square value, $p = 0.837$ ($p > 0.05$)

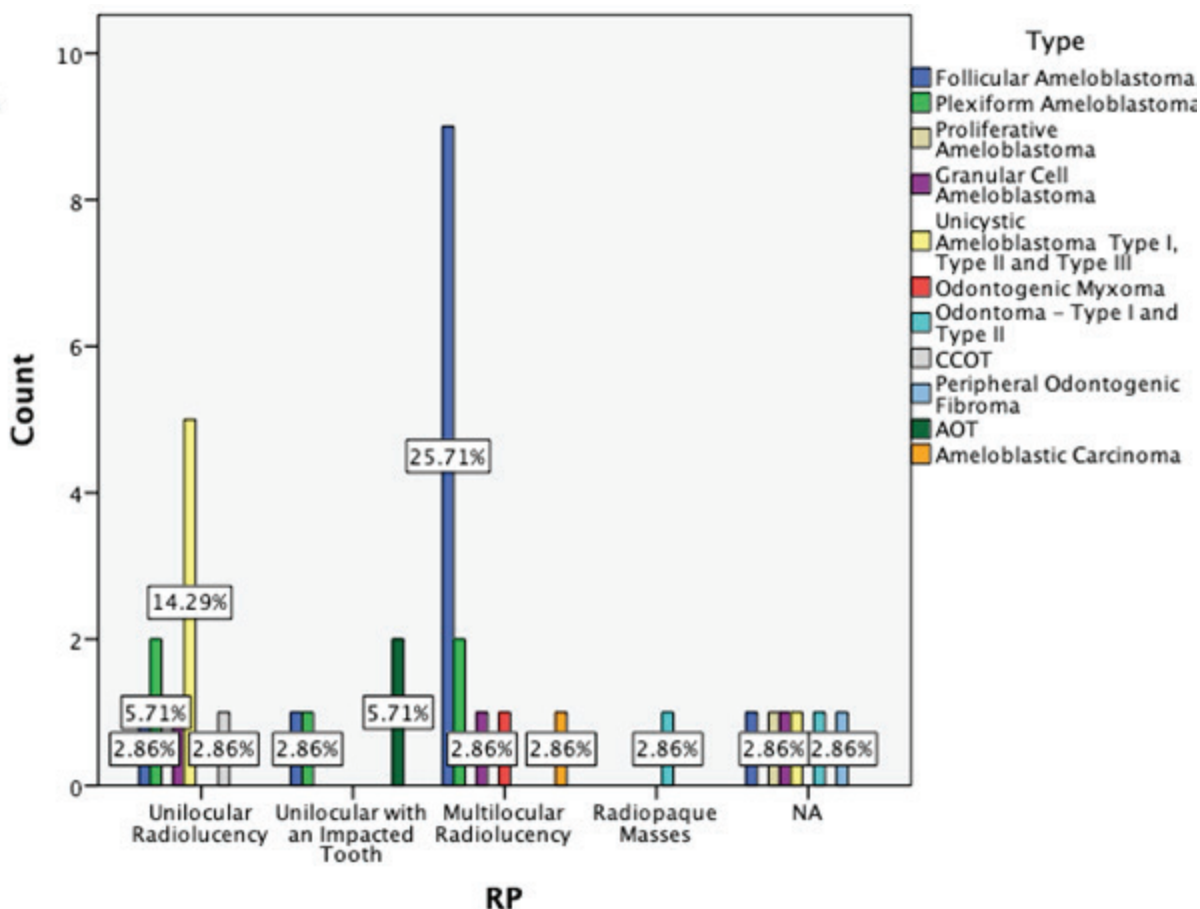


Figure 5 - Bar chart representing the association between various types of OTs and their radiographic presentation. Radiographic representations of OTs are in the ‘x’ axis and the study population count in the ‘y’ axis. Here, the colour dark blue represents follicular ameloblastoma, light green represents plexiform ameloblastoma, mustard represents proliferative ameloblastoma, purple represents granular cell ameloblastoma, yellow represents unicystic ameloblastoma (inclusive of all types), red represents odontogenic myxoma, turquoise represents odontoma (inclusive of all types), grey represents calcifying cystic odontogenic tumors, blue represents peripheral odontogenic fibroma, dark green represents adenomatoid odontogenic tumours and orange represents ameloblastic carcinoma. Follicular ameloblastoma most commonly presents as a multilocular radiolucency (25.71%) and this was found to be statistically significant. Chi square value, p = 0.04 (p< 0.05)

Conclusion

Within the limits of this study, there is an existing male predilection in the mandibular posterior region. Most cases are benign, occur after the age of 40 years and are asymptomatic with multilocular radiolucencies. On considering a time span of the last five years, we have 1550 established biopsy cases out of which 35 were odontogenic tumours. Thus, the prevalence rate of odontogenic tumours is approximately 2.26%. The most prevalent type of odontogenic tumour found was

ameloblastoma followed by odontomas and adenomatoid odontogenic tumours. Overall, there was no noteworthy change in trend with regard to the pattern of prevalence of OTs. But due to our aforementioned shortcomings and controversy of literature, further research has to be done to confirm our existing findings. As they are predominantly asymptomatic, proper diagnosis and timely management is required.

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Conflict of Interest: None Declared

Ethical Clearance: It is taken from “Saveetha Institute Human Ethical Committee” (Ethical Approval Number- SDC/SIHEC/2020/DIASDATA/0619-0320)

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