Original article

Clinico-pathological analysis of Odontogenic Tumors over 28-year-period in Benghazi, Libya

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ABSTRACT:

Background: Odontogenic tumors (OTs) are rare lesions that unique to the jaws constituting about < 1% of all oral tumors. They are a complex group of heterogeneous behavior that range from tumor like lesions, benign tumors to malignant neoplasms with potential to metastases.
Aim of study: To describe the relative incidence of odontogenic tumors (According to World Health Organization classification 2022) at Oral Pathology Department in Benghazi and compare the finding with the literatures.
Methods: A retrospective study of 106 OTs was documented for the demographic data. Statistical analysis was carried out by software *SPSS*.
Results: OTs constituted 1.2% of all diagnosed oral lesions with 97% of them were benign tumors. Ameloblastoma was the most common type (37.7%) followed by odontomas (24.5%). The peak incidence was around the third decade with male: female ratio 1:1.12. mandible was the most common site (64%).
Conclusion: OTs are relatively uncommon lesions among our sample that is similar to other literatures with some variations.

Keywords: *Odontogenic tumors, retrospective study, incidence, World Health Organization classification, Benghazi.*

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INTRODUCTION:

Odontogenic tumors (OTs) are uncommon lesions that are unique to the gnathic bones. They are accounted for < 1% of all oral tumors.[1, 2] From a biological point of view, the majority of these lesions are benign neoplasms and some exhibit malignant behavior with metastatic capacity, while the rest represent as hamartomas lesions.[1]

Odontogenic tumors can be originated either from the odontogenic epithelium such as dental lamina, reduced enamel epithelium, rests of Serres or rests of Malassez, or from odontogenic mesenchymal tissues such as dental follicle, dental papilla, pulp or periodontal ligament, or from both.[3] Several classification schemes based on the origin of the tumor have been devised.[4] The first histological typing of OTs "histological typing of OTs" was published by the World Health Organization (WHO) in 1971 and was reviewed and updated in 1992 and 2005.[5]

In 2017, the WHO updated the classification to reclassifiy the "keratocystic odontogenic tumor" and "calcifying cystic odontogenic tumor" as odontogenic cysts. Furthermore, primordial odontogenic tumors were included as mixed tumor and cemento-ossifying fibroma as mesenchymal tumors. In addition, the fibro-odontoma was included as a benign variant of the odontoma.[6] Recently, the 5th edition of the World Health Organization classification was available online (Table 1). The most important update was adding Adenoid ameloblastoma as a new entity to the epithelial odontogenic neoplasms.[7]

Retrospective studies have been conducted around the world that reported variable geographic distribution. These variations are attributed to the high cultural and genetic diversity.[8, 9] Knowledge of the clinical presentation of OTs and their epidemiology are necessary to understand the characteristics and behaviour of these lesions and can be valuable in developing a clinical differential diagnosis.[6, 10]

This study aims to investigate the frequency and distribution of histologically diagnosed odontogenic tumors at the department of oral pathology in Benghazi, and compare data with the literatures.

Table 1: 2022 WHO classification of odontogenic tumors

Benign epithelial odontogenic tumors	**Benign mesenchymal odontogenic tumors**
Adenomatoid odontogenic tumor	Odontogenic fibroma
Squamous odontogenic tumor	Cementoblastoma
Calcifying epithelial odontogenic tumor	Cemento-ossifying fibroma
Ameloblastoma, unicystic	Odontogenic myxoma
Ameloblastoma, extraosseous/peripheral	
Ameloblastoma, conventional	
Adenoid ameloblastoma	
Metastasizing ameloblastoma	
Benign mixed epithelial & mesenchymal	**Malignant odontogenic tumors**
odontogenic tumors	Sclerosing odontogenic carcinoma
Odontoma	Ameloblastic carcinoma
Primordial odontogenic tumor	Clear cell odontogenic carcinoma
Ameloblastic fibroma	Ghost cell odontogenic carcinoma
Dentinogenic ghost cell tumor	Primary intraosseous carcinoma, NOS
	Odontogenic carcinosarcoma
	Odontogenic sarcomas

METHODS:

The archival records of the oral pathology department- University of Benghazi were revised retrospectively from January 1990 to December 2018. A total of 106 cases were diagnosed as OTs during this period. The histopathological diagnosis was based on 2022 WHO histopathologic classification.
All collected cases were reviewed and analyzed for the demographic features including, age of patient, gender, tumor location, and histopathological type. This study was taken out with permission from the institutional authorities. Statistical analysis was carried out using SPSS.

RESULTS:

A total of 106 OTs cases were diagnosed from 1990 to 2018 which constituted 1.2 % of all registered biopsies (8995 diagnostic samples). Of the cases 103 (97%) were benign OTs while only 3 cases were diagnosed as malignant OTs (Table 2).
Ameloblastoma was the most frequently diagnosed odontogenic tumor 40 (37.7 %) followed by odontoma 26 (24.5%) and adenomatod odontogenic tumors 10 (9.4%). Male to female ratio of all registered OTs was 1:1.12 (table2).

Table 2: Relative frequency and gender distribution of Odontogenic Tumors 1990-2018

Diagnosis	No.	%	Male No(%)	Female No(%)	M: F Ratio
AME	40	37.7	25 (62.5)	15 (37.5)	1.6:1
AOT	10	9.4	4 (40)	6 (60)	1 : 1.5
CEOT	5	4.7	2 (40)	3 (60)	1 : 1.5
OD compound OD (12) complex OD (13)	26	24.5	10 (38.5)	16 (61.5)	1 : 1.6
OM	7	6.6	4 (57.1)	3 (42.9)	1.3 : 1
OF	4	3.8	2 (50)	2 (50)	1 : 1
CB	1	0.9	-	1 (100)	0 : 1
AF	2	1.9	2 (100)	-	1 : 0
COF	8	7.5	-	8 (100)	1 : 0
AC	3	2.8	1	2	1:2
Total	**106**	**100**	**50 (47.2%)**	**56 (52.8%)**	**1:1.12**

AME=Ameloblastoma, AOT=Adenomatoid odontogenic tumor, CEOT=Calcifying epithelial odontogenic tumor, OD=Odontoma, OM= Odontogenic myxoma, OF= Odontogenic fibroma, CB=Cementoblastoma, AF=Ameloblastic fibroma, COF= Cemento-ossfiying-fibroma, AC=Ameloblastic carcinoma.

The peak incidence of OTs was in the third decade. Patient age ranged widely between 5 -75 with a mean age of 26.51 years. Age was not reported in two cases. (table 3)

Of a total of 106 lesions in our series, the location was reported in 103 cases. The mandible showed the highest prevalence with overall 66 cases (64%) while 35 cases of OTs (34%) were identified in the maxilla (Mandible: maxilla ratio was 1.9:1). Only two cases (1.9%) were found peripherally in the gingiva. (table 4).

According to ameloblastoma, unicystic type comprised 21 cases (53.8%), multicystic variant were 17 (43.6%), with only one case (2.6 %) of peripheral ameloblastoma. The histological pattern of one case was not specified (Figure 1). Male to female ratio was 1.6:1 and the mean age of occurrence was (30.88) (Tables 2- 3). Regarding the site, the posterior mandible was the most affected site (71.4%) (Figure 2). Regarding odontoma (26 cases), 13 cases were diagnosed as complex odontoma and 12 cases were identified as compound odontoma. Male to female ratio was (1:1.6) with the mean age of 17.56 years. The percentage of occurrence in the mandible and maxilla were (60%), (40%) respectively (tables 2-3 and4)

Table 3: Age group distribution of Odontogenic tumors by life decade

Diagnosis	Age Range	Mean Age (SD)	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79
AME (40)	13-75	30.88± 13.48	-	8	12	11	6	1	1	1
AOT (10)	10-30	17.9± 6.19	-	7	3	-	-	-	-	-
CEOT(5)	5-70	45± 27.99	1	-	-	-	-	2	-	1
OD (26)	9-40	17.56±7.67	2	15	7	-	1	-	-	-
OM (7)	11-55	24.57±14.89	-	4	1	1	-	1	-	-
OF (4)	20-56	35.5±15.17	-	-	1	2	-	1	-	-
CB (1)	00	00	-	-	-	1	-	-	-	-
AF (2)	6-15	10.50±6.36	1	1	-	-	-	-	-	-
COF (8)	9-60	32.5±16.16	1	-	2	3	-	1	1	-
AC (3)	22-50	31.67±15.89	-	-	2	-	-	1		-
Total (106)	**5-75**	**26.65±14.53**	**5**	**35**	**28**	**18**	**7**	**7**	**2**	**2**

Table 4: Site distribution of Odontogenic tumors 1990-2018

tumor type	Mandible No, %	Maxilla No, %	Gingiva No, %
AME (39)	34 (87.2 %)	4(10.3%)	1(2.6%)
AOT (10)	1(10%)	9(90%)	-
CEOT (4)	-	4(100%)	-
OD (25)	15(60%)	10(40%)	-
OM (7)	4(57.1%)	3 (42.9%)	-
OF (4)	1(25%)	2(50%)	1(25%)
CB (1)	1(100%)	-	-
COF (8)	6(75%)	2(25%)	-
AF (2)	1(50%)	1(50%)	-
AC (3)	3(100%)	-	-
Total (103)	**66 (64%)**	**35 (34%)**	**2 (1.9%)**

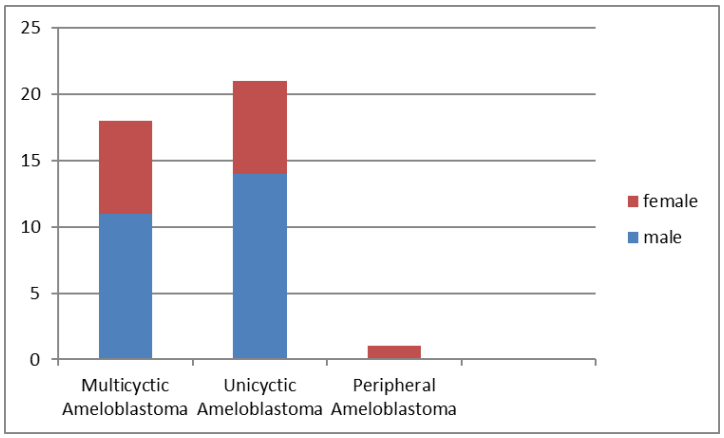

Figure (1): the frequency of histological types of ameloblastoma with gender predominance

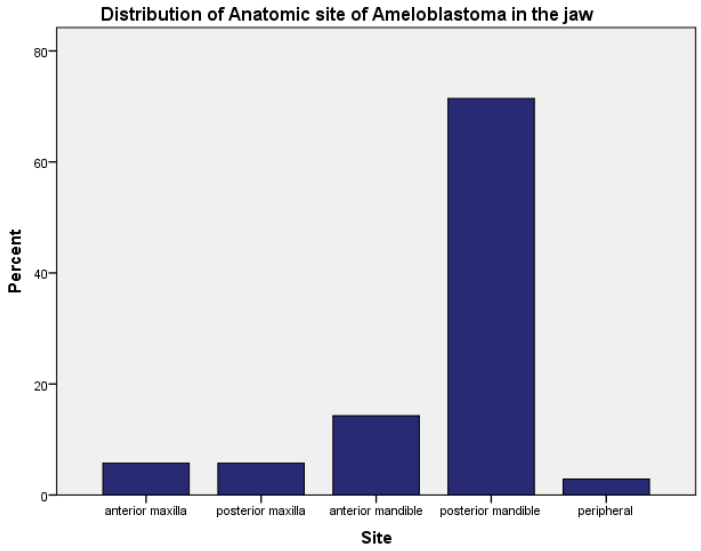

Figure (2): distribution of anatomical sites of ameloblastoma in the jaws

DISCUSSION:

Odontogenic tumors are relatively uncommon lesions with diverse clinical and histopathological features that are derived from tooth forming tissue.[11, 12] This study was done in Benghazi University to document the prevalence of odontogenic tumors.

The relative frequency of OTs in our sample was 1.2% of the total biopsied specimens recorded in Oral Pathology Department in Dental faculty of Benghazi University in a period between 1990 to 2018. This low frequency is similar to those reported in other studies.[1, 13-17] while higher incidence was conducted by some researchers.[11, 18-21]

This data confirms that benign tumors are the most frequently seen (97%) while malignant OTs representing only (3%) that in agreement with the previous literatures.[6, 8, 15, 22-25]

We have observed predominance of OTs in female (52.8%) more than male (47.2%) with male: female ratio 1:1.12 that are corroborating in other studies.[6, 9,

[11, 14, 26, 27] However, the male predilection conducted by other researchers.[11, 18, 28, 29]

The peak incidence of OTs was in the third decades with the mean age of 26.51 years. This result was similar to that found in the other literatures.[11, 16, 18, 21, 27, 30-33] Less mean age less than a decade was shown by some authors.[23, 25] A remarkable preference for mandible was documented (64%) which concurs with other papers. [1, 6, 9, 11, 13, 15-19, 34]

Ameloblastoma was by far the most frequent tumor in this data with percentage (37.7%). This is concordance with many studies.[6, 11, 13, 19, 26, 35] The second most common tumor was odontoma (24.5%) and this was similar to a result reported by silva et.al. [6] However, this differ from the previous papers which considered Amloblastoma and odontogenic Keratocyst were more frequent.[1, 5, 21, 28, 32, 36, 37] The explanation for this marked variations was the WHO 2005 classification which classified OKC as Odontogenic tumors.

Of all ameloblastoma cases, 53.8% were unicystic type, 43.6% were multicystic variant while the peripheral ameloblastoma only constituted 2.6%. these results are similar to a study done by Filipe, et al.[14] Most studies showed that multicystic type was the most frequent type. [1, 6, 18, 26, 38]

Ameloblastoma was more common in mandible (87.2%) than maxilla (10.3%). This result was in agreement with previous studies.[8, 21, 26, 33, 39] The peak incidence of ameloblastoma was 30.88 which is consistent with other studies.[40, 41] The occurrence of tumors in a younger age group was observed in other reports. [9, 11, 15, 16, 21, 32] In this research, ameloblastoma was shown male predilection (62.5%) compared with female (37.5%) in support of recent studies.[1, 9, 11, 15, 18, 32]

Regarding odontoma, the peak of incidence was in the second decade that seems similar to previous reports.[15, 21, 33] Moreover, similar male to female ratio (1:1.6) was documented by chrysomali et.al.[1] Some studies reported equal distribution in the mandible and maxilla.[1, 33] However, in this sample higher percentage was noticed in the mandible.

AOT represented the third most common tumor in our data (9.4%), similar percentage was pointed out by the literature taken out in India.[42] while slightly lower percentage reported by sharma et. Al.[43]

In 2017, WHO classification recognized COF as odontogenic tumor [6] that was the cause of missing data about it in the most previous studies. In our data, 8 cases were reported (7.5%) representing the forth common odontogenic tumor.

The odontogenic myxoma was reported as the third most common tumor by de Medeiros et.al.[6] and the second one in other publications [11, 25, 31] . However, in our sample it represented the fifth common tumor (6.6%).

In this sample, 5 and 4 cases were reported as CEOT and odontogenic fibroma respectively. the less frequent tumors were ameloblastic carcinoma (3 cases), ameloblastic fibroma (2 cases) and cementoblastoma (one case).

CONCLUSION:

With the comparison with previous study, we found some variations in the profile of incidence and prevalence of the OTs and this due to different changes and updates among WHO classification. Moreover, the geographic variations and study design also play a crucial role in the epidemiology. The present study reflects not only the differences in the distribution of OTs but also similarities among the previous population samples assessed around the world.

To sum up, our data documented the odontogenic cases in Benghazi and was compared with previous literatures. Epidemiological studies are important because they allow to know more precisely the occurrence of these lesions in the diverse population, which help to identify the groups at risk with a view of the most common clinical features related to them.

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