Original Article

Benign Tumors and Tumor-like Lesions of the Oral Cavity and Jaws: An Analysis of 709 Cases

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Abstract

Purpose: The purpose was to examine the prevalence, gender, age and site(s) of odontogenic and nonodontogenic benign tumors, and tumor-like lesions occurring in the oral cavity and jaws in a Turkish population, particularly, in the Eastern Turkey, and to compare findings of this study with other reports. **Materials and Methods:** The data were collected from the files of the Department of Oral and Maxillofacial Surgery and the Department of Oral Pathology, Ataturk University, Turkey, during a 10-year period from January 2005 to January 2015. They were analyzed descriptively regarding prevalence, age, sex, lesion type, and site. **Results:** A total of 709 benign tumor and tumor-like lesions of the oral cavity, and jaws were selected during a period of 10 years. One hundred and twenty-one of these lesions (17%) were odontogenic benign tumors while 588 (83%) were nonodontogenic benign tumor and tumor-like lesions. **Conclusions:** This study revealed that the distribution and characteristics of benign tumors and tumor-like lesions of oral cavity and jaws in the Turkish population, particularly including the Eastern region of Turkey have some differences as well as similarities with the findings of studies in different populations.

Keywords: *Nonodontogenic benign tumors, odontogenic tumors, oral cavity and jaws, tumor-like lesions*

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Introduction

Different lesions affect the oral cavity and jaws. They include tumors of odontogenic origin as well as nonodontogenic tumor and tumor-like lesions. The frequency or the ratio of these lesions differs depending on the population and geographical location.[1] Other factors, such as age, gender, and localization also define lesions.[2,3]

There are a large number of studies of oral cavity and jaw tumor and tumor-like lesions in different populations and geographic locations.[1,4-7] However, the most studies of the Turkish population are based on odontogenic-origin lesions and they offer knowledge on the central and Western parts of Turkey.[2,4,8] There is a study and it provides information on the pediatric population.[9]

There is a very little information about nonodontogenic benign tumor and tumor-like lesions from the Turkish population. Therefore, the aim of this research was to examine the distribution regarding prevalence, gender, age and site of odontogenic and nonodontogenic benign tumors, and tumor-like lesions occurring in the oral cavity and jaws in a Turkish population, particularly, in the Eastern of Turkey, and to compare findings of this study with other reports.

Materials and Methods

Biopsy records of patients diagnosed with odontogenic and nonodontogenic tumors and tumor-like lesions from January 2005 to January 2015 were obtained from the files of the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry and the Department of Pathology, Faculty of Medicine, Ataturk University, Erzurum, Turkey. All case records were reevaluated

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to classify the lesions according to the World Health Organization (WHO) (2005) odontogenic tumors classification.[10] They were analyzed descriptively regarding prevalence, age, sex, lesion type, and site. The lesions were divided into two types: Benign odontogenic tumors and nonodontogenic benign tumor and tumor-like lesions. The latter was analyzed into a classification including two groups as soft tissue and bone-related lesions. Incomplete clinical data reports with a doubtful or controversial diagnosis and malignant tumors were excluded from the study. With regard to the site of the odontogenic tumor, the maxilla and mandible were divided into three anatomic regions: Anterior, premolar, and molar. The molar area of the mandible also included the angle and ramus. The nonodontogenic benign lesion site was divided into six anatomic regions: Maxilla (gingiva/alveolus), mandible (gingiva/alveolus), palate, cheek, tongue, and lip.

This study was reviewed and approved by Ataturk University, Faculty of Dentistry Local Ethics Committee.

Results

A total of 2337 biopsies related to oral cavity and jaws were found during a period of 10 years. Seven hundred and nine benign tumor and tumor-like lesions of the oral cavity and jaws were selected. There were 121 (17%) odontogenic benign tumors, 588 (83%) nonodontogenic benign tumor and tumor-like lesions. There were 300 male and 409 female patients. The male:female ratio was 1:1.4. The age of the patients ranged from 1 to 85 years (mean age: 39.5 years, standard deviation [SD]: 19.8 years).

Odontogenic benign tumors

The male:female ratio of odontogenic benign tumors was 1.1:1. The age of the patients varied from 6 to 79 years, with a mean age of 33.9 years (SD 17.4). These tumors were frequently seen between the age of 10 and 49 years with a peak incidence in the third decades of life. Keratocystic odontogenic tumors (KCOTs) were the most frequent (42.2%), followed by odontomas (33.1%), ameloblastomas (11.6%), and odontogenic myxomas (8.3%). Gender and age distribution of odontogenic tumors in this Turkish population are shown in Tables 1 and 2.

Table 3 shows site distribution of odontogenic tumors. As shown, 68.6% of the lesions were located in the mandible, especially in the molar/ramus (43.8%) region. KCOTs were the most frequent tumors seen in the molar/ramus of the mandible (46.3%). The most frequent tumors seen in the maxilla were odontomas, whereas most of the other odontogenic tumors were more common in the mandible.

Table 1: Gender distribution of odontogenic and nonodontogenic benign tumors and tumor-like lesions

Pathology	Male	Female	Male:female ratio	Total (%)
Odontogenic				
KCOT	35	16	2.2:1	51 (42.2)
Compound odontoma	11	12	1:1.1	23 (19)
Complex odontoma	10	7	1.4:1	17 (14.1)
Ameloblastoma	4	10	1:2.5	14 (11.6)
Odontogenic myxoma	2	8	1:4	10 (8.3)
Cementoblastoma	0	2	Female	2 (1.6)
CCOT	1	0	Male	1 (0.8)
Ameloblastic fibro-odontoma	0	1	Female	1 (0.8)
Odontogenic fibroma	0	1	Female	1 (0.8)
CEOT	1	0	Male	1 (0.8)
Total (odontogenic tumors)	64	57	1.1:1	121 (100)
Nonodontogenic				
Soft tissue-related lesions				
PGCG	97	123	1:1.3	220 (37.4)
Epulis fissuratum	41	68	1:1.7	109 (18.5)
Fibroma	24	33	1:1.4	57 (9.7)
Pyogenic granuloma	18	32	1:1.8	50 (8.5)
Capillary hemangioma	8	11	1:1.4	19 (3.2)
Cavernous hemangioma	2	2	1.1	4 (0.7)
Papilloma	6	14	1:2.3	20 (3.4)
Pleomorphic adenoma	8	7	1.1:1	15 (2.5)
Verruca vulgaris	1	2	1:2	3 (0.5)
Fibrolipoma	2		Male	2 (0.3)
Total	207	292	1:1.4	499 (84.7)
Bone-related lesions				
CGCG	19	32	1:1.7	51 (8.7)
Ossifying fibroma	4	7	1:1.8	11 (1.9)
Osteoma	2	8	1:4	10 (1.7)
Torus/exostosis	3	7	1:2.3	10 (1.7)
Fibrous dysplasia	1	6	1:6	7 (1.3)
Total	29	60	1:2	89 (15.3)
Total (nonodontogenic)	236	352	1:1.5	588 (100)
All of pathologies	300	409	1:1.4	709

KCOT=Keratocystic odontogenic tumor; CCOT=Calcifying cystic odontogenic tumor; CEOT=Calcifying epithelial odontogenic tumor; PGCG=Peripheral giant cell granuloma; CGCG=Central giant cell granuloma

Nonodontogenic benign tumors and tumor-like lesions

The male:female ratio of nonodontogenic benign tumors and tumor-like lesions was 1:1.5. The age of the patients varied from 1 to 85 years, with a mean age of 41.4 ± 19.9 years. These lesions were frequently seen between the age of 40 and 69 years with a peak incidence in the fifth decades of life. In soft-tissue-related lesions, peripheral giant cell granulomas (PGCGs)

Table 2: Age distribution of odontogenic and nonodontogenic benign tumors and tumor-like lesions

Pathology	0-9	10-19	20-29	30-39	40-49	50-59	60-69	>70	Age (mean)
Odontogenic									
KCOT	0	8	9	10	13	8	1	2	37.7
Compound odontoma	2	11	6	3	1	0	0	0	20.3
Complex odontoma	0	3	8	2	2	1	1	0	29.7
Ameloblastoma	0	1	3	2	5	1	2	0	39.6
Odontogenic myxoma	0	0	4	2	1	1	1	1	39.2
Cementoblastoma	0	1	0	0	0	0	1	0	39.5
CCOT	0	0	0	0	0	1	0	0	56
Ameloblastic fibro-odontoma	0	1	0	0	0	0	0	0	16
Odontogenic fibroma	0	0	0	1	0	0	0	0	34
CEOT	0	0	0	0	0	0	0	1	71
Total	2	25	30	20	22	12	6	4	33.9
Nonodontogenic									
Soft tissue-related lesions									
PGCG	19	54	21	26	32	32	28	8	35.1
Epulis fissuratum	0	0	0	0	24	41	30	14	55.3
Fibroma	2	1	2	9	14	15	9	5	49.2
Pyogenic granuloma	2	10	13	7	8	5	3	2	34.2
Capillary hemangioma	1	2	8	0	4	1	2	1	35.2
Cavernous hemangioma	0	1	1	0	0	0	2	0	42.5
Papilloma	2	2	0	4	5	2	2	3	40.3
Pleomorphic adenoma	0	1	1	3	5	4	1	0	44.7
Verruca vulgaris	0	1	0	0	1	1	0	0	36.7
Fibrolipoma	0	0	0	0	0	0	0	2	74.5
Total	26	72	46	49	93	101	77	35	41.8
Bone-related lesions									
CGCG	2	6	6	11	13	6	6	1	38.9
Ossifying fibroma	1	2	1	5	1	1	0	0	28.1
Osteoma	0	0	1	3	1	2	2	1	49.7
Torus/exostosis	0	2	0	0	5	1	1	1	40.1
Fibrous dysplasia	0	0	4	1	2	0	0	0	31.6
Total	3	10	12	20	22	10	9	3	38.9
Total (nonodontogenic)	29	82	58	69	115	111	86	38	41.4

KCOT=Keratocystic odontogenic tumor; CCOT=Calcifying cystic odontogenic tumor; CEOT=Calcifying epithelial odontogenic tumor; PGCG=Peripheral giant cell granuloma; CGCG=Central giant cell granuloma

Table 3: Site distribution of odontogenic benign tumors

Pathology	Maxilla			Mandible		
	Anterior	Premolar	Posterior	Anterior	Premolar	Molar/ramus
KCOT	2	2	9	10	3	25
Compound odontoma	11	1	4	1	4	2
Complex odontoma	0	1	5	1	2	8
Ameloblastoma	0	0	1	1	2	10
Odontogenic myxoma	0	0	3	0	0	7
Cementoblastoma	0	1	1	0	0	0
CCOT	0	0	0	0	1	0
Ameloblastic fibro-odontoma	0	0	0	0	0	1
Odontogenic fibroma	0	0	1	0	0	0
CEOT	0	0	0	1	0	0
Total	13	5	24	14	12	53
Percentage	10.8	4.1	19.8	11.6	9.9	43.8
Total (%)	38 (31.4)			83 (68.6)		

KCOT=Keratocystic odontogenic tumor; CCOT=Calcifying cystic odontogenic tumor; CEOT=Calcifying epithelial odontogenic tumor

Table 4: Site distribution of nonodontogenic benign tumors and tumor-like lesions

Pathology	Maxilla	Mandible	Palate	Cheek	Tongue	Lip
Soft tissue-related lesions						
PGCG	102	115	3	0	0	0
Epulis fissuratum	32	48	1	28	0	0
Fibroma	12	6	1	33	2	3
Pyogenic granuloma	34	14	1	1	0	0
Capillary hemangioma	5	5	2	3	1	3
Cavernous hemangioma	0	0	1	2	0	1
Papilloma	2	1	5	6	1	5
Pleomorphic adenoma	0	0	14	1	0	0
Verruca vulgaris	0	0	0	1	0	2
Fibrolipoma	0	0	0	2	0	0
Bone-related lesions						
CGCG	21	28	2	0	0	0
Ossifying fibroma	2	9	0	0	0	0
Osteoma	3	7	0	0	0	0
Torus/exostosis	0	6	4	0	0	0
Fibrous dysplasia	5	2	0	0	0	0
Total	218	241	34	77	4	14

PGCG=Peripheral giant cell granuloma; CGCG=Central giant cell granuloma

were the most frequent lesions (37.4%), followed by epulis fissuratum (18.5%), pyogenic granulomas (8.5%), hemangiomas (3.9%), papillomas (3.4%), pleomorphic adenomas (2.5%), verruca vulgaris (0.5%), and fibrolipomas (0.3%). Among bone-related lesions, central giant cell granulomas (CGCGs) were the most frequent lesions (8.7%) followed by ossifying fibromas (1.9%), osteomas (1.7%), torus/exostosis (1.7%), and fibrous dysplasia (1.2%). Gender and age distribution of nonodontogenic benign tumor and tumor-like lesions in a Turkish population are shown in Tables 1 and 2.

PGCGs were the most frequent in soft-tissue related lesions located in the maxilla and mandible. The most common soft-tissue-related lesions observed in the cheek, palate, lip, and tongue were fibromas, pleomorphic adenomas, papillomas, and fibromas, respectively.

The most frequent bone-related lesions seen in the maxilla and mandible were CGCGs. The majority of bone-related lesions were observed in the mandible (57.3%), except for fibrous dysplasia, which was more common in the maxilla. Table 4 shows site distribution of nonodontogenic benign tumors and tumor-like lesions.

Discussion

Odontogenic tumors are lesions derived from epithelial and/or mesenchymal elements that are part of the tooth-producing tissues or its remnants. The lesions range from hamartomatous tissue proliferation to malignant neoplasms, with metastatic potential.[11,12] In humans, odontogenic tumors are comparatively rare, comprising about 1% of all tumors in the jaw.[4] They are mostly located intraosseously in the mandible and maxilla and occasionally extraosseously in the gingiva.[4] The WHO published the first edition of the histological classification of odontogenic tumors in 1971. Since then, there have been many controversies concerning the terminology and classification of odontogenic tumors. Therefore, the WHO published updates in 1992 and 2005.[12]

In this study, benign odontogenic tumors represented 5.2% of biopsies related to oral cavity and jaws. This is higher than from reports of some studies,[2,4,5] but similar to reports of other studies that were higher than 5%.[1,13] Geographical location or the frequency of biopsy may be caused to these differences. In addition, benign odontogenic tumors represented 17% of benign tumors and tumors-like lesions of the oral cavity and jaws. This prevalence is similar to reports of some studies which examined odontogenic tumors as the part of tumor and tumor-like lesions (15–31%).[14,15]

Gender prevalence was nearly equal in this study, in common with that found in the previous studies.[2,4,8,13] A male predominance was reported in Chinese population.[12] In this study, odontogenic tumors were found most frequently in the third decades of life. This finding is similar to that of Chinese population reports.[5,12] Odontogenic tumors were more common in the mandible in this study as found in the previous studies.[2,4,5,12]

KCOTs were the most frequent (42.2%) odontogenic tumors in this study [Table 1]. This data confirms the findings of other studies in Brazil[6] and China.[5] KCOTs were the second most prevalent tumors after ameloblastomas according to the studies in China,[12] Libya,[1] India,[16] South Africa,[17] Sri Lanka,[18] and Turkey.[2] In this study, the KCOTs were most commonly located in the mandibular posterior region [Table 3], in agreement with that recorded in the previous studies.[2,5,12] They were observed in all age groups except for early childhood, with a peak incidence in the fifth decades of life. The mean age of those with KCOTs was 37.7 years, and there was a male predominance (2.2:1). In a systematic review, MacDonald-Jankowski[19] reported that they occurred in all age groups but that they were most common in the third decades of life and showed a male predominance. In this study, odontomas (33.1%) were the second most frequent odontogenic tumors. According to the literature, the prevalence of odontomas seems to vary widely, from 2.2% to 75.6%.[1,4,5,14,20,21] The great variability in the incidence of these tumors among studies could be due to differences in biopsy preferences of clinicians for these tumors.

In the present series, ameloblastomas were less frequent (11.6%) [Table 1] than reported in the most previous studies.[2,12,16-18] Some studies[20,21] have reported a high frequency of odontomas, and others[5,6] have reported a high frequency of KCOTs compared to ameloblastomas. The higher female prevalence among the patients with ameloblastomas in the present study is in agreement with the results of some studies;[2,4,8] however, in contrast to many reports.[1,4,12-15] Almost 93% of the ameloblastomas occurred in the mandible [Table 3], with a very high mandible to maxilla ratio (13:1). This finding is similar to that reported by Sriram and Shetty[22] (95%, 18.1:1). The ratios of ameloblastomas were very high compared to those of reported in earlier studies. In an extensive review of 3,677 cases of ameloblastomas, Reichart *et al*.[23] found a ratio of around 5.4:1. In this study, the molar-ramus region was the most commonly affected site (71.4%), which is similar to that of the previous studies.[1,5,12-17]

We did not observe adenomatoid odontogenic tumors in our series, although they were common in some series.[13,22] In studies of a Turkish population Günhan *et al*.[8] (2.5%), Olgac *et al*.[4] (2.1%), and Sekerci *et al*.[2] (1.8%) observed relatively low rates. The absence of adenomatoid odontogenic tumors in our series may be due to regional differences. In addition, we did not observe squamous odontogenic tumors, ameloblastic fibromas/fibrodentinomas, or dentinogenic ghost cell tumors in this study. In this study, the numbers of other benign odontogenic tumors, such as cementoblastomas, calcifying cystic odontogenic tumors, ameloblastic fibro odontomas, odontogenic fibromas, and calcifying epithelial odontogenic tumors were too low. Other studies[12,13,15,20] also reported a low prevalence of these tumors, confirming the rarity of these tumors.

In this study, nonodontogenic benign tumors and tumor-like lesions represented 83% of all benign tumors and tumor-like lesions in the oral cavity and jaw and 25.2% all biopsies. Of these, soft-tissue-related lesions comprised 84.7%, and bone-related lesions comprised 15.3%. The male:female ratio was 1:1.5, and there was a female preponderance. The prevalence of benign tumors and tumor-like lesions peaked in the fifth and sixth decades of life, which is probably related to the marked prevalence of PGCGs, epulis fissuratum, and fibromas in this age range.

Most studies of nonodontogenic benign tumors have grouped the lesions according to the preference of the authors rather than grouping them according to a specific classification system. This makes it difficult to compare the findings of the present study with those of earlier studies. Thus, the findings have been compared with those of studies analyzing a particular lesion group as well as a few studies using the classification system.

A PGCG is a reactive, exophytic lesion that occurs primarily in gingival tissue and the alveolar ridge, originating from the periosteum or periodontal membrane in both dentate and edentulous areas.[24,25] PGCGs were the most frequent lesions in this study (37.4%) [Table 1]. In contrast, in other studies,[1,26] fibromas were the most frequent tumors. In this study, PGCGs showed a slight predilection for females (1:1.3), in common with that reported in some other studies.[27,28] However, some series found no gender differences.[24,25] In this study, PGCGs were observed in all age groups, with a peak incidence in the second decades of life [Table 2]. The mean age (35.1) was similar to that reported by Motamedi *et al*.[24] (mean age: 31). In contrast, one study reported that PGCGs were most common in the seventh decades of life.[25] In our series, 52.3% of the PGCGs occurred in the mandible, and the prevalence of these lesions in the mandible and maxilla was very similar. Some previous studies reported that they occurred more often in the mandible than in the maxilla.[24,25]

Epulis fissuratum was the second most frequent (18.5%) lesion in our series [Table 1]. This type of lesion is often seen at the edges of prosthesis in patients with poorly fitting dentures. In the present series, cases of epulis fissuratum were more prevalent in female patients

over 40 years, similar to that found in the previous studies.[29,30]

Fibroma is most often encountered in adults and is primarily located on the gingiva, lips, and buccal mucosa. Other common sites are the borders of the tongue[1,26] The sites in this study were similar to those reported in earlier studies, with fibromas found in all the aforementioned regions.[1,26] They were most frequently seen in cheek mucosa and mostly in adults.

In this study, pyogenic granulomas were mostly observed in gingival tissue and in female patients, in common with that recorded in other studies.[26,31]

Hemangiomas are relatively common benign proliferations of vascular channels that may be present at birth or arise during early childhood.[32] Hemangiomas were most commonly observed in the gingival tissue, followed by the buccal mucosa [Table 4]. Many studies have reported that they were more frequently located in the tongue.[1,26] In the present series, the capillary type was more common than the cavernous type, similar to that found in an earlier study.[1]

Papillomas were the most often located on the lip, palate, and cheeks [Table 4]. In the previous studies, the palate[1] and tongue[26] were the most common sites.

In the present series, pleomorphic adenomas were mostly observed in the palate, in accordance with the findings of previous research.[1,33]

A CGCG is a benign lesion that usually occurs in the mandible and the maxilla.[27] CGGGs were more common in females than in males and more prevalent in the mandible than in the maxilla [Tables 1 and 4], consistent with the findings of other studies.[1,27]

Ossifying fibromas were found more often in the mandible than in the maxilla [Table 4], consistent with a previous report.[34] In contrast, another study reported that the maxilla was the most common site of ossifying fibromas.[1] In this study, ossifying fibromas were predominant in females, in accordance with the findings of various studies.[1,34] Eversole *et al*.[34] reported that ossifying fibromas were common in the third and fourth decades of life. In this study, where the age range of the participants was from 5 to 50, they were most common among those in the fourth decades of life.

An osteoma is a benign, osteogenic neoplasm, which is composed of well-differentiated mature bone tissue. Johann *et al*.[35] have reported that it was more commonly found in the mandible than in the maxilla. Similarly, in our series, osteomas were more often seen in the mandible. In contrast, El-Gehani *et al*.[1] have reported that it was more often seen in the maxilla (including palate).

Tori and exostoses are nodular protuberances of mature bone. Torus palatinus and torus mandibularis are the two most common intraoral osseous outgrowths.[36] In this study, six cases were observed in the palate, and four were observed in the mandible. They were more frequent in those older than 40. Because of these lesions are asymptomatic, they can be rather detected with the diagnosis made by check or prosthetic purposes. Therefore, it is difficult to obtain precise information about the age of onset.

Fibrous dysplasia is considered a dysplastic process of the bone. In a review, Eversole *et al*.[37] reported that the maxilla was the most commonly affected bone in craniofacial bones as supported by the findings of our study.

Conclusions

This study has revealed that the distribution and characteristics of benign tumors and tumor-like lesions of oral cavity and jaws in the Turkish population, particularly including the Eastern region of Turkey have several differences as well as similarities with findings of studies in different populations. The information obtained from this study and similar studies which carried out in different countries and populations will be help to assess benign tumors and tumor-like lesions by clinicians and pathologists.

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Conflicts of interest

There are no conflicts of interest.

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