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Epidemiological study of intraosseous lesions of the stomatognathic or maxillomandibular complex diagnosed by a Reference Centre in Brazil from 2006–2017

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Abstract

This epidemiological study was designed to find out the incidence and factors associated with the occurrence of intraosseous lesions diagnosed at a Reference Centre in Brazil. We included all patients diagnosed with intraosseous lesions (cyst, tumour, bone-associated lesion, and periapical disease) during the period 2006–2017, and analysed the association between some sociodemographic and clinical variables and the types of lesion. There was a total of 290 intraosseous lesions, the most common being odontogenic cysts. There was a significant association between age and odontogenic tumours ($p = 0.001$). In relation to the histopathological diagnosis, root cysts were the most common ($n = 57$), followed by dentigerous cysts ($n = 26$). The lesions studied were seen most often in women between the second and fourth decades of life, odontogenic cysts being the most common type found. We know of few publications of similar epidemiological work, either in Brazil or in the rest of the world, so we suggest that more such studies are made.

Keywords: Stomatognathic System; Bone Cysts; Epidemiology

Introduction

In 1952 the World Health Organizationpublished the first classification of intraosseous lesions affecting the jaws and, subsequently, this classification was modified (1992 and 2005). The latest modification of the WHO classification, currently accepted worldwide, was published in 2018, and introduced some changes from the 2005 classification, the main one being the reinclusion of odontogenic keratocyst and Gorlin cyst in the group of odontogenic cysts.[1]

Among the groups of intraosseous lesions with most likelihood of maxillary involvement are: first, odontogenic and non-odontogenic cysts, such as radicular, dentigerous, and nasopalatine cysts; secondly, odontogenic and non-odontogenic tumours, such as odontoma, ameloblastoma, and osteoma; and thirdly, lesions associated with bone such as fibro-osseous or cemento-osseous dysplasia, and central ossifying fibroma.[2,3]

Benign intraosseous lesions of the jaws are difficult to diagnose, as most are usually asymptomatic, slow-growing,

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Table 1
Distribution of patients with intraosseouslesions and their groups. CRLB / UEFS, Feira de Santana-BA, Brazil (2006–2017). Data are number (%).

Variables	Intraosseous lesions (n = 291)	Cysts (n = 138)	Odontogenic tumours (n = 49)	Bone-associated lesions (n = 68)	Periapical diseases and others (n = 26)
Sex:					
Male	92 (31)	55 (40)	15	12	8
Female	198 (69)	83 (60)	34	56	18
Age group (years):[1]					
00-10	13 (5)	6 (4)	6	1	0
11-20	48 (17)	17 (12)	20	10	1
21-30	45 (16)	24 (18)	6	5	10
31-40	60 (21)	27 (20)	9	10	7
41-50	32 (11)	21 (15)	4	5	2
51-60	34 (12)	19 (14)	2	12	1
61-70	29 (10)	14 (10)	0	12	3
71-80	15 (5)	6 (4)	1	6	2
81-90	3 (1)	2 (2)	0	0	0
Site:					
Anterior mandible	44 (15)	20 (15)	11	11	1
Posterior mandible	123 (42)	55 (40)	16	37	9
Anterior maxilla	73 (25)	44 (32)	16	5	8
Posterior maxilla	50 (17)	19 (14)	6	15	8

[1] Two worksheets did not mention the patient's age.

Table 2
Bivariate analysis for cysts. CRLB / UEFS, Feira de Santana-BA, Brazil (2006–2017). Data are number (%).

Variables	Cysts (n = 138)	Non-cystic lesions	p value
Sex:			
Male	55 (40)	37 (24)	0.005*
Female	83 (60)	115 (76)	
Site:			
Anterior mandible	20 (15)	24 (16)	
Posterior mandible	55 (40)	68 (45)	0.071
Anterior maxilla	44 (32)	29 (19)	
Posterior maxilla	19 (14)	31 (20)	
Age group (years):[1]			
0-10	6 (4)	8 (5)	
11-20	17 (12)	31 (21)	
21-30	24 (18)	21 (14)	
31-40	27 (20)	33 (22)	0.15
41-50	21 (15)	12 (8)	
51-60	19 (14)	18 (12)	
61-70	14 (10)	16 (11)	
71-80	6 (4)	12 (8)	
81-90	3 (3)	0	

[1] Two worksheets did not give the information.
* $p \leq 0.05$.

Table 3
Bivariate analysis for tumours. CRLB / UEFS, Feira de Santana-BA, Brazil (2006–2017). Data are number (%).

Variables	Tumours (n = 49)	Non-tumoural lesions	p value
Sex:			
Male	15	77 (32)	0.85
Female	34	164 (68)	
Site:			
Anterior mandible	11	33 (14)	
Posterior mandible	16	107 (44)	0.136
Anterior maxilla	16	57 (28)	
Posterior maxilla	6	44 (18)	
Age group (years):[1]			
0-10	6	8 (3)	
11-20	20	28 (12)	
21-30	6	39 (16)	
31-40	9	51 (21)	0.001*
41-50	4	29 (12)	
51-60	2	35 (15)	
61-70	0	30 (13)	
71-80	1	17 (7)	
81-90	0	3 (3)	

[1] Two worksheets did not give the information.
* $p \leq 0.05$.

and often diagnosed on routine radiography, such as that required for orthodontic planning.[3,4]

The epidemiology of odontogenic cysts and tumours has been widely reported internationally, and emphasis placed on more destructive lesions such as ameloblastoma.[5] In Brazil, the prevalence of odontogenic tumours ranges from 1.3% to 4.8%, which is similar to other Latin American countries such as Chile and Mexico.[6] As far as odontogenic cysts and bone-associated lesions are concerned national epidemiological data are scarce, but the epidemiological profile resembles those of other countries such as Ghana, Canada, and Libya.[7]

Epidemiological studies are crucial to understanding real conditions and to encouraging the implantation and maintenance of oral health programmes for given populations. The number of studies of the epidemiology of oral lesions is low compared with those aimed at caries and periodontal disease, which are emphasised by the WHO. The Brazilian guidelines of the National Oral Health Policy have not included in their programme the tracking of changes in normality and of lesions of the stomatognathic system, which are extremely important for the development of an epidemiological profile of the country.[8]

Table 4
Bivariate analysis for bone-associated lesions. CRLB / UEFS, Feira de Santana-BA, Brazil (2006–2017). Data are number (%).

Variables	Bone-associated lesions (n = 68)	Non-bone-associated lesions	p value
Sex:			
Male	12	80 (36)	0.004*
Female	56	142 (64)	
Site:			
Anterior mandible	11	33 (15)	
Posterior mandible	37	86 (39)	0.001*
Anterior maxilla	5	68 (31)	
Posterior maxilla	15	35 (16)	
Age group (years):[1]			
0-10	1	13 (6)	
11-20	10	38 (17)	
21-30	5	40 (16)	
31-40	17	43 (20)	0.04*
41-50	5	28 (13)	
51-60	12	25 (11)	
61-70	12	18 (8)	
71-80	6	12 (6)	
81-90	0	3 (1)	

[1] Two worksheets did not give the information.
* $p \leq 0.05$.

Table 5
Bivariate analysis for periapical diseases. CRLB / UEFS, Feira de Santana-BA, Brazil (2006–2017). Data are number (%).

Variables	Periapical diseases (n = 26)	Non-periapical disease-related lesions	p value
Sex:			
Male	8	84 (32)	0.91
Female	18	180 (68)	
Site:			
Anterior mandible	1	43 (16)	
Posterior mandible	9	114 (43)	0.102
Anterior maxilla	8	65 (25)	
Posterior maxilla	8	42 (16)	
Age group (years):[1]			
0-10	0	14 (5)	
11-20	1	47 (18)	
21-30	10	35 (13)	
31-40	7	53 (20)	0.03*
41-50	2	31 (12)	
51-60	1	36 (14)	
61-70	3	27 (10)	
71-80	2	16 (6)	
81-90	0	3 (1)	

[1] Two worksheets did not give the information.
* $p \leq 0.05$.

We need to know which intraosseous lesions of the jaws occur most often, and the profile of the patients who are affected, so that we can plan actions that can help the community. The aim of this study, therefore, was to find out the incidence of intraosseous lesions of the stomatognathic complex in patients treated at the Reference Centre for Oral Injuries (RCOI) of the State University of Feira de Santana from 2006 to 2017.

Patients and methods

Design, area of study, and characterisation of the sample

This research is registered in the Ethics Committee of the State University of Feira de Santana under protocol no. 015/2008, CAAE 0015.0.059.000-08.

This is a cross-sectional study using secondary data, based on a survey of the biopsy records and conclusive anatomopathological reports of central oral lesions diagnosed in the Dentistry course between 2006 and 2017 by the RCOI of the State University of Feira de Santana. The population studied consisted of all patients with an intraosseous lesion diagnosed by the RCOI. The criteria for exclusion were: descriptive reports; reports with the same registration number; and different diagnoses for the same patient. The study was conducted in accordance with the World Medical Declaration of Helsinki.

Collection of data and selected variables

The data were collected by a single research worker trained to complete the collection worksheet on sex, age, clinical suspicion, histopathological diagnosis, and anatomical site. The sociodemographic variables such as sex (male/ female), age (decades of life), and clinical condition, were selected for the statistical analysis, and included histopathological diagnosis and anatomical location (anterior mandible, lower incisors, and canines; posterior mandible, lower molars, and premolars; anterior maxilla, upper canines, and incisors; and posterior maxillary, upper molars, and premolars).

Statistical analysis

Descriptive statistics: the lesions were grouped according to the 2017 WHO classification of intra-osseous lesions of the jaws. If a lesion did not fit into this classification, the remaining lesions were classified as periapical diseases and others (intraosseous diseases that did not fit into any group). The distribution of the population was defined by the information contained in the collection worksheet (sex, age, and anatomical location).

Analytical statistics: the significance of differences between groups was assessed using IBM SPSS Statistics for Windows (version 21.0, IBM Corp) using absolute and percentage distributions. For the bivariate analysis, the normality of the continuous data was assessed using the Kolmogorov-Smirnov test. Then, the chi squared test was applied for categorical variables, and the Kruskall-Wallis followed by the Mann-Whitney *U* test with Bonferroni's correction for continuous variables. Probabilities of 0.05 or less were accepted

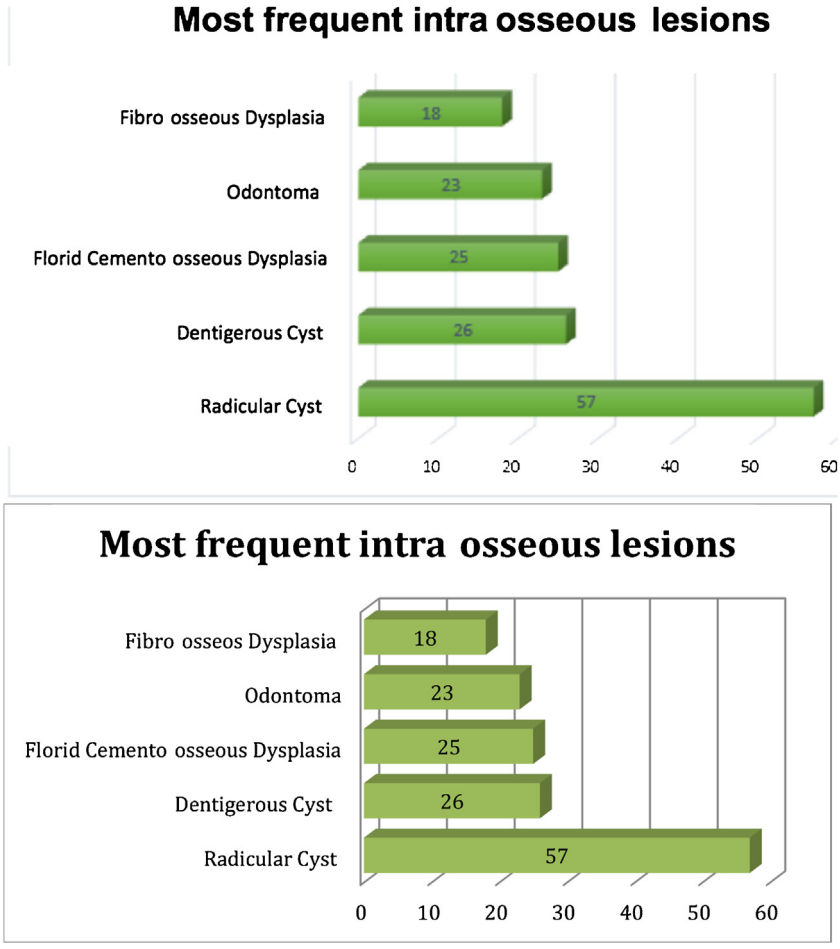

Fig. 1. Distribution of the number of cases of the five most common intraosseous lesions according to the histopathological diagnosis, CRLB/UEFS, Feira de Santana-BA, Brazil, 2006–17.

as significant. All data were charted, and tables constructed for both descriptive analysis and analytics using Microsoft Excel.

Results

During the study period, the RCOI biopsied 2051 oral lesions, 290 of which (14%) were intraosseous, and the subgroup of cysts was the largest (n = 138, 48%). Table 1 shows the sex and age of the patients, and Table 2 a bivariate analysis of cysts compared with non-cystic lesions. Table 3 shows a bivariate analysis for tumours compared with non-tumoural lesions, Table 4 a bivariate analysis of bone-associated lesions compared with those not associated with bone, and Table 5 a bivariate analysis of periapical disease compared with the rest. Periapical granuloma was the sole entity for periapical diseases (n = 26) (Fig. 1).

Discussion

Intraosseous lesions were mainly diagnosed in women between the second and third decades of life. Odontogenic cysts were most common, and sex, age, and anatomical site may be associated factors. Female patients were most affected by intraosseous lesions, which corroborates the study by Phattaratarip et al,[8] from Chulalongkorn University in Bangkok, Thailand. However, some other studies have shown that men may be most affected.[9–12] These discrepancies can be explained by the fact that those studies involved groups of particular lesions with specific characteristics, and this paper covers all intraosseous lesions.

The age group with the most cases was the second to fourth decades of life, and this finding is in agreement with studies from Africa,[13] the Middle East,[14] Asia,[15,16] America and Europe.[6,7]

As in the studies of Johnson et al,[6] Ramachandra et al,[10] and Koivisto et al,[17] the group of intraosseous lesions with the highest prevalence was odontogenic cysts, possibly because of the common occurrence of inflammatory and dentigerous cysts associated with teeth in the process of necrosis, and impacted, respectively. In addition, these two types of cysts are the most common currently reported.[6,10,18] As this study classified the intraosseous lesions based on the fourth edition of the WHO Classification, the keratocysts make up the group of odontogenic cysts, which distinguishes them from

the results of the papers selected for comparison. Women were most affected, which differs from other studies carried out in Brazil[5] and Mexico.[11]

Odontogenic tumours were the third most prevalent group in this study, following cysts, which were first, and bone-associated lesions, which were second. They are characterised by heterogeneity among lesions, which presents a challenge both in diagnosis and treatment.[19] Odontomas were the most prevalent of the groups, followed by unicystic ameloblastomas. However, AlSheddi et al[14] in Saudi Arabia found that odontogenic keratocysts were the most common, followed by ameloblastomas. This can be justified by the difference in the WHO classification, as they used the third edition (2005), which classifies keratocysts as tumours, whereas we used the fourth, which classifies them as a cyst. Other published papers report the second and third decades of life as age groups most likely to be affected,[10,13]as we did. It is worth noting that this and other studies provided evidence that age is a factor associated with the development of these lesions.[10,16] The high prevalence of women reported in this study diverges from the evidence from the studies of Ramachandra et al,[10] Nalabolu et al,[16] Lawal et al,[12] Kabede et al,[9] and Al Sheddi et al,[14] but is in agreement about the anatomical site of the lesion.

According to the classification that we adopted, the group including bone-associated lesions involves all bone tumours and related lesions,[2] but we could find few published studies that included the lesions that make up this group. The most common are studies involving fibro-osseous lesions or fibro-osseous dysplasias. Sex is a factor associated with this group with women generally more affected, a fact that is confirmed by the study by Muwazi et al[13] from Uganda. These data are related to fibro-osseous dysplasia with a considerable number of cases in this study, as it is often associated with women. The fourth decade of life predominated in most cases, in contrast to the work of Phattarataratip et al[8] and Prabhu et al,[19] who showed the second decade to be the most prevalent age group. Like other studies,[9,14,20] we found that the mandible was the anatomical site with the highest predilection for this group of lesions, being a significant factor throughout the study.

Periapical diseases were the smallest group in this series. Most publications do not include such diseases in their research, but we included them because they are within the cortical bone, and therefore classed as intraosseous lesions. All cases were of periapical granuloma, a benign lesion that stems from an inflammatory process associated with pulpal necrosis of the tooth.[1] Age was a related factor, although it was not possible to confirm this, as we know of no studies that prove this association. This finding can therefore be attributed to only a small sample of this group.

Studies that portray oral health are based largely on clinical data, and so not able to illustrate the actual histopathology and morbidity of the lesions. In Brazil, oral pathology services have oral diseases diagnosed by a medical pathologist, so epidemiological studies of oral lesions are scarce.[20] The present study was carried out in a Reference Centre for oral lesions, where oral pathologists drew up histopathological reports.

We could find few published epidemiological studies on central or intraosseous lesions, as most of them discuss the frequency and prevalence of lesions from retrospective reports.[7,9,10,11] They cannot therefore draw a sociodemographic profile of the population, or outline risk groups or factors associated with the development of the lesions because they do not produce analytical statistics. Of note is the fact that the present study is a cross-sectional study, and we used standard statistical tests.

Currently, most published works have used the third WHO Classification for Intraosseous lesions (2005), so the papers chosen for discussion and comparison, for the most part, differ in their categorisation of some lesions compared with this study, which was based on the fourth edition. Consequently, we had some difficulty in comparing results that we found with those of current published reports.

Conclusion

The lesions studied were more common in the posterior mandible in women between the second and fourth decades of life. The most common were odontogenic cysts, and the most common histopathological diagnosis was radicular cyst, followed by dentigerous cyst, florid cemento-osseous dysplasia, odontoma, and fibro-osseous dysplasia. Sex, age, and anatomical site may all be associated factors for some intraosseous lesions – for example, the correlation between age and tumours. We know of few publications of epidemiological studies in Brazil or in the world, and suggest therefore that more studies of this nature are done to reduce the morbidity of intraosseous lesions.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

This research is registered in the Ethics Committee of the State University of Feira de Santana under protocol no. 015/2008, CAAE 0015.0.059.000-08. Patient consent was not required.

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