Idiopathic Osteosclerosis and Condensing Osteitis in a Sample of the Lebanese Population: A Digital Panoramic Based Study

Elie Hayek¹, Elie Maalouf², Jean Nassar², Fadi AbiLamaa², Georges Aoun¹

**ABSTRACT**

**Background:** Idiopathic osteosclerosis (IO) is an area of enlarged bone production in the jaw that usually appears radiopaque and round, elliptical, or irregular in shape. Condensing osteitis (CO) is a focalized osseous reaction leading to periapical sclerotic bone growth. **Objective:** The aim of this study was to investigate the prevalence, localization, shape, and dental relationship of IO and CO in a group of Lebanese patients and to correlate these findings to age and gender. **Methods:** 520 digital panoramic radiographs of patients (215 men and 305 women) ranging in age from 18 to 77 (mean age 40.89 years) who visited the Faculty of Dental Medicine, Lebanese University, for dental treatment were included in this study and assessed for IO and CO. The prevalence of the two lesions according to gender and age, as well as their localization, and dental relationship, were recorded and saved in an Excel sheet. **Results:** Among the 520 radiographs, 47 (9%) showed IO, and 30 (5.8%) showed CO. Both lesions are more frequent among females in their third decade and are essentially found in the mandible, mainly in relation to the root apices. **Conclusion:** Within the limits of this study, we concluded that in our sample of the Lebanese population, the prevalence of IO and CO is low and supports the theory that IO can be defined as developmental variations of normal bony architecture unrelated to a local stimulant, and CO could be considered reactive bone formations related to pulpitis, deep restoration, or caries. **Keywords:** Prevalence; idiopathic osteosclerosis; condensing osteitis; digital panoramic radiograph; mandible; maxilla.

1. **BACKGROUND**

Idiopathic osteosclerosis (IO) is an increased development of compact bone, also known as enostoses or dense bone islands, which extends from the inner surface of cortical bone into cancellous bone. Radiographically, it presents defined borders and various sizes and shapes, such as round, elliptical, or irregular (1).

IO affects 5% of the population and is usually seen in teens or young people in their twenties. It affects the mandible and the maxilla and may also be found in other skeletal regions such as the pelvis, long bones, and spine. In the jaws, IO can be completely isolated from the teeth or associated with the root of vital teeth in the posterior regions, with a mandibular predilection (2,3,4).

IO is asymptomatic and is incidentally discovered during a dental radiographic examination. Its etiology is unknown, although a few studies have mentioned a correlation between IO development and traumatic occlusion. For many authors, no changes were registered in shape or size on the following radiographs over time; however, several studies have described changes in lesion sizes (5,6,7,8).

Condensing osteitis (CO) is a periapical abnormal bone growth lesion that results from chronic pulp infections of the teeth. This sclerotic reaction is caused by the immunity of healthy patients against offending bacteria to decrease their degree of virulence. It is asymptomatic, localized, and usually detected during a routine radiographic examination (8,9). Contrary to IO, the pulp in CO is affected, either chronically inflamed or necrotic (9).

CO primarily affects molar regions less frequently in the maxilla than in the mandible, probably due to abundant irrigation and low cortical thick-
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Deep dental restorations or severe caries (10). In the majority of CO cases, performing endodontic treatment on the affected teeth returns the lesion to normal. However, in some other cases, the bony changes remain visible on radiographs, sometimes even after extraction of the associated tooth (5).

Differential diagnoses for both CO and IO include cementoblastoma, hypercementosis, root remnants of lacteal teeth, sclerosing osteomyelitis, and cementing and ossifying fibromas (7).

2. OBJECTIVE
The aim of this study was to investigate radiologically the prevalence and characteristics of IO and CO simultaneously in a Lebanese population with respect to age, gender, shape, localization, and dental relationship.

3. MATERIAL AND METHODS
This retrospective study was conducted on 520 digital panoramic radiographs, selected randomly from adult patients (305 females and 215 males) attending the Department of Oral Medicine and Maxillofacial Radiology, Faculty of Dental Medicine, Lebanese University. According to the faculty regulations, all patients provide their informed consent for the anonymous future use of their radiographs for research purposes. All radiographs were acquired using a Sirona® digital panoramic unit, with settings set between 60-80 kVp, 8-10 mA, and 12.8 s for the exposure time.

Exclusion criteria comprised bad-quality radiographs that showed distortion, asymmetry, and patient positioning errors.

All radiographs were assessed separately, on the same monitor, over approximately one month by three oral and maxillofacial radiologists with more than 20 years of experience. All cases of disagreement between the three investigators were excluded.

Lesions surrounding the apices of teeth that are chronically inflamed with deep carious lesions, root canal treatment, or large restorations were considered to be CO. On the other hand, well-defined lesions related or not to the teeth without any factors that could cause inflammation were classified as IO.

The patients ages were divided into three groups: group 1: 10–25 years old; group 2: 25–50 years old; and group 3: 50–77 years old.

In all assessed radiographs, age and gender were recorded, and panoramic radiographs presenting IO or CO were scanned and digitized and then examined by the investigators. Additionally, the location and site of the lesions and their dental relationships were recorded; moreover, involved teeth and their status, such as those with deep caries or large restorations, were also registered. The location of the lesion was distributed between the maxilla and mandible, and according to the tooth relationship, the site was classified into four categories: *Molar Apex (Figure 1); *Premolar Apex (Figure 2); *Interradicular or Between the Roots (Figure 3); *Non-Tooth-Related (Figure 4).

All results were saved in an Excel sheet, and the data were statistically analyzed using the IBM® SPSS® software version 20.0 (SPSS Inc., Chicago, Illinois).

4. RESULTS
This study evaluated a total of 520 digital panoramic radiographs (305 females and 215 males), aged between

<table>
<thead>
<tr>
<th>Location</th>
<th>Idiopathic Osteosclerosis (n=47)</th>
<th>Condensing Osteitis (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premolar Apex</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Molar Apex</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Interradicular</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Non tooth Related</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Maxilla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premolar Apex</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Molar Apex</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Interradicular</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Non tooth Related</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3. Distribution of IO and CO according to locations, sites and tooth relationships

<table>
<thead>
<tr>
<th>Relationship with</th>
<th>Idiopathic Osteosclerosis (n=47)</th>
<th>Condensing Osteitis (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Restorations</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Deep Caries</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Endodontic Treatment</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Percentage %</td>
<td>2.1%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4. Percentage of relationship between IO and CO with large restorations, deep caries, and endodontic treatments
18 and 77 years (mean age: 40.89). Patients’ age group, gender, and mean age of the patient sample are shown in Table 1.

Both types of lesion were identified in 77 of the 520 radiographs, for an overall prevalence of 14.8% of patients. Among these are 47 (9%) IO and 30 (5.8%) CO. Some patients had more than one lesion.

Out of the 47 radiographs showing IO, 32 were for females and 15 for males, with a mean age of 38.3 years. As for CO, it was found in 30 radiographs, among which 25 belonged to females and 5 to males, with a mean age of 26.8 years (Table 2).

The number of lesions located in the mandible was 33 IO and 21 CO, compared to 14 IO and 9 CO in the maxilla. As a result, the percentage of IO detected in the mandible (70%) was found to be significantly higher than shown in the maxilla (30%); this was similar to CO lesions with 70% in the mandible and 30% in the maxilla.

Concerning locations and sites, the lesions largely involved the posterior regions. However, their comparison revealed similarities. Both lesions exhibited a higher rate of involvement in the molar apex than the premolar apex or interradicular regions.

In addition, out of 47 IO, 28 (60%) were not related to any tooth, with 20 in the mandible and 8 in the maxilla, compared to 0% of CO that were not tooth-related (Table 3).

Table 4 shows the number of teeth associated with CO that presented deep caries and large restorations or treated canals.

5. DISCUSSION

The main objective of this study was to determine the prevalence of IO and CO in a sample of the Lebanese population. To our knowledge, our research represents the first assessment of these two jawbone radiopacities in Lebanon. Our investigation found that the prevalence of IO and CO was 9% and 5.8%, respectively, which is within the range of other studies that have been published in the area. A similar study by Al-Habib conducted on a sample of the Saudi population revealed a prevalence of 8.8% for IO and 5.9% for CO (7).

Our findings did not agree with those of Miloglu et al., who investigated both lesions in a sample of the Turkish population and found lower values with 2.44% for IO and 0.81% for CO (11). On the other hand, Farhadi et al’s
findings in an Iranian sample for IO (7.5%) were similar to ours, whereas CO results (7.8%) were higher (12).

It’s interesting to note that none of the earlier studies published in the literature reported a higher rate of CO compared to IO.

In our study, the prevalence of both lesions was higher in females than males. This was in line with what Miloglu et al. from Turkey (11), McDonnell from British Columbia (13), and Avramidou et al. from Greece (14), among others, reported. Our findings also corroborate those of Yeh et al., who suggested that the dominance of the female gender over the male in terms of IO and CO prevalence would be connected to certain female hormones that influence bone formation (10).

In our study, the patients’ ages varied from 10 to 77 years, with a mean age of 40.89. IO and CO were mostly detected at ages ranging between 17 and 38 years, with a mean age of 38.3 and 26.8, respectively; therefore, the prevalence of both lesions in the Lebanese population tended to be higher in the younger population. This result matches the study conducted by Al-Habib (7), who reported that most participants who had positive findings were in their third decade of life. In terms of CO, a possible interpretation could be related to high caries and pulpal infection incidence at these specific ages.

A higher prevalence of both lesions was noticed in the mandible than in the maxilla. This supports what was found by Al-Habib (7) and Miloglu et al. (11) and might somewhat be explained by fewer problems with the superimposition of anatomic structures existing in the mandible than in the maxilla in the panoramic radiographs (5). Moreover, our results showed that the IO lesions were found in the premolar region more frequently than the CO lesions, which were found to be more prevalent in the molar region, probably due to caries, pulp infections, or deeply restored teeth, which were mostly found in molars than in premolars. The same findings were reported by Miloglu et al. (11).

Finally, our study aiming to evaluate the prevalence of IO and CO in a Lebanese population is not without limitations. Because of the limited number of radiographs assessed, definite conclusions must be delayed until future research validates our findings.

6. CONCLUSION

The prevalence of IO and CO in a sample of the Lebanese population investigated by assessment of digital panoramic radiographs is mostly found to be similar to what has been reported in many studies in different populations. These lesions are more frequent among females in their third decade and are mainly found in the mandible. Our findings support the theory that IO could be described as developmental deviations of normal bony architecture unconnected to a local stimulant, whereas CO might be regarded as reactive bone formations associated with pulpitits, deep restorations, or caries.

REFERENCES