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ORIGINAL ARTICALE

THE PREVALENCE AND RADIOGRAPHIC ANALYSIS OF IDIOPATHIC OF OSTEOSCLEROSIS IN THE JAWS IN A SAMPLE IN ERBIL CITY.

Sarkawt Hamad Ali[1]
[1]Lecturer, Department of Oral Diagnosis, College of Dentistry, Hawler Medical University, Erbil, Kurdistan Region, Iraq. sarkawt.ali@hmu.edu.krd
***Corresponding Author**: Sarkawt Hamad Ali , Department of Oral Diagnosis, College of Dentistry, Hawler Medical University, Erbil, Kurdistan Region, Iraq. sarkawt.ali@hmu.edu.krd

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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. To determine the prevalence of idiopathic osteosclerosis (IO) in the mandible using cone beam computed tomography by radiographic evaluation and to investigate the relationship between the findings in relation to age, gender, and localization.

Materials and **Methods:** This cross-sectional study was performed on all CBCT images obtained in 2020 and 2024 from the archive of Oral and Maxillofacial Radiology Center in the Erbil City, the study included 1000 cone beam computed radiography obtained from the patients attend our center (500 men and 500 women) whose ages ranged from 20–70 years and who visited the Oral and Maxillofacial Radiology Center in the Erbil City between 2020 and 2024, IO was defined as homogenous radiopacities with no particular etiology, ranging from 2 mm to 2 cm in size. Demographic information of all patients, as well as the lesion's number, location, border, shape, and association with adjacent teeth were recorded.

Results: From 1000 CBCT images, 101 images (10.1%) had IO lesion. No gender differences were observed in IO prevalence (P = 0.704). Although most common in patients who were in their 30s, IO prevalence was not statistically different among age groups (P = 0.297). IO was most frequent in the molar region 56 casas, with 55.4% of lesions, most lesions appear round 46 cases with 45.54%, most lesions separate from cortical plates 37 with 36.6% cases. **Conclusions:** Idiopathic osteosclerosis (IO) prevalence was 10.1% in the studied population and was not statistically different between age groups or sexes. Most lesions were found in the mandibular molar region.

Keywords*:* Idiopathic osteosclerosis, Mandible, Prevalence, Cone beam computed tomography

INTRODUCTION

Idiopathic osteosclerosis (IO) is an area of increased bone production in the jaw and generally appears to be round, elliptical, or irregular and radiopaque in shape.[1–3] According to the literature, although this disorder is sometimes described as a dense bone island, bone scar, focal periapical osteopetrosis, or enostosis,[3] IO is often preferred because of its unknown origin.[4–6] These lesions may be accepted as developmental intraosseous anatomic variations[7] and should be classified separately from the cases resulting from inflammatory origin or systemic disease.[4–6]

These asymptomatic lesions are generally discovered as incidental findings on radiographs taken for other reasons.[7]

On radiographic evaluation, IO may be detected in various sizes, ranging from 2 or 3 mm to 1 or 2 cm in diameter,[2,3,8–10] or the lesions may be very large, almost the entire height of the body of the mandible. [11,12]They may occur at root apexes, between the roots, or in a separate location away from the teeth, primarily in the premolar/molar region and with a predilection for the mandibular arc.[2,3,5,13,14] .

The purpose of this study was to determine the prevalence and distribution of the IO in the jaws of the patients attending our center by examining the cone beam computed radiography the patient records, and to investigate the relationship of the findings to the age and gender in the population of the Erbil City.

MATERIALS AND METHODS

A total of 1000 cone beam computed radiography obtained from the patients attend our center (500 men and 500 women) whose ages ranged from 20–70 and who visited the Oral and Maxillofacial Radiology Center in the Erbil City between 2020 and 2024, for different purposes and reasons (impactions, implants, pathological, orthodontic, prosthetic, surgical or other reasons) IO was defined as homogenous radiopacities with no particular etiology, ranging from 2 mm to 2 cm in size. Demographic information of all patients, as well as the lesion's number, location, border, shape, and association with adjacent teeth were recorded. of the patients taken during routine dental examination, the cone beams computed tomography that displayed the jaws, without asymmetry, distortion, or error in patient positioning were included in the study. For the diagnosis, IO was defined as the symptomless, radiopaque areas that are often elliptical or round in shape and vary in size from a minimum of 3 mm to more than 2 cm. The patients who had a questionable IO and who met the following criteria were excluded from this study.[2,8,15]

Radiopacities directly associated with deep caries or large restorations;

- The characteristics of the lesion were mixed with radiopaque-radiolucent areas in the form of periapical cemental dysplasia and other benign fibro-osseous lesions or an odontoma.
- The remnants of deciduous or permanent teeth were clearly identifiable;
- The radiopacities were interpreted as a tori or exostoses, salivary calculus, tonsolith, or calcified lymph node.
- There is an increased thickening of the lamina dura around teeth with marked malposition or which were serving as abutments for fixed bridges or partial dentures;
- Solitary radiopacities in edentulous regions.

Image analysis

Images were analyzed by two observers (intereaxaminer) (an oral and maxillofacial radiologist, and a trained senior dentist) in identical room and monitoring conditions. IO was defined as homogenous radiopacities with no particular etiology, sized between 2 mm and 2 cm. If the observers disagreed, the senior researcher's remarks were considered.

Images were first studied in panorama view for IO detection. Cross-sectional and sagittal images were used to further confirm the presence of IO. Demographic data of patients with IO was recorded as well as number, location, border and shape of lesions and their association with adjacent teeth. Moreover, we also observed that lesions were associated with the mandibular canal and buccal and lingual cortices.

Statistical analysis

Data was entered in a Statistical Package for the Social Sciences software (SPSS, version 23). Descriptive analysis, chi-square test, and t-test were used for statistical analysis. Level of significance was set at $\alpha = 0.05$.

RESULTS

In our study the value was 0.95 for interobserver agreement in IO detection in images, indicating excellent agreement. From 1000 CBCT images, 101 images this indicates that 10.1% of the studied population exhibited idiopathic osteosclerosis table no.1.

Table 1. Distribution of IO.

Total Cases	IO Cases	Prevalence (%)
1000	101	10.1%

Table 2. Distribution of IO to different age groups.

Age Group	Total Cases	IO Cases	Prevalence (%)
10-19	355	29	8.17%
20-29	244	28	11.48%
30-39	156	20	12.82%
40-49	123	14	11.38%
50-59	82	8	9.76%
60-70	40	2	5.00%

The table no.2 presents the distribution of Idiopathic Osteosclerotic (IO) cases across different age groups, showing the highest percentage in the 30-39 age group (12.82%), followed by 20-29 (11.48%) and 40-49 (11.38%). The lowest prevalence is observed in the 60-70 age group (5.00%). This data suggests that IO is more commonly found in younger and middle-aged adults, with a decline in older individuals.

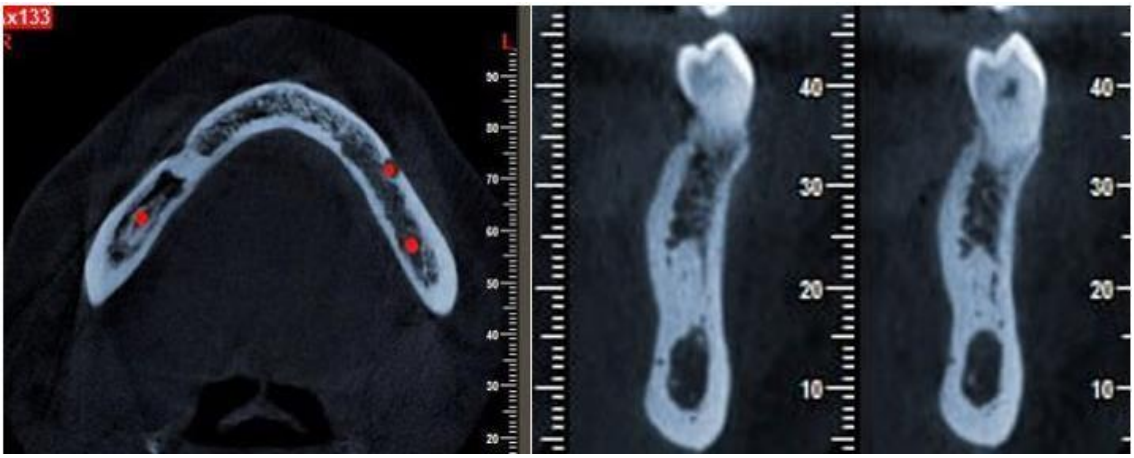

Figure 1. Axial and cross-sectional views of CBCT of IO in the mandible in close contact with both cortical plates.

Table 3. Distribution of IO in relation to the Cortical plates.

Cortical Plate Relationship	Number of Cases	Percentage (%)
Separate from cortical bone	37	36.6%
Attached to buccal cortex	28	27.7%
Attached to lingual cortex	20	19.8%
Attached to both cortices	16	15.8%
Total	101	100%

Regarding the distribution of Idiopathic Osteosclerosis (IO) in Relation to Cortical Plates (101 Cases), the findings of this study indicate that 36.6% of IO cases were separate from the cortical bone table no.3.

Table 4. Shapes od IO.

Shape	**Number of Cases**	**Percentage (%)**
Round	46	45.54%
Irregular	40	39.60%
Oval	15	14.85%
Total	101	100%

And the shapes of the lesions in our study found that round shape (45.54%) and irregular shape (39.60%) shapes are the most common, while oval shape lesions (14.85%) are the least frequent table no. 4 and figure no. 1.

Table 5. Distribution of IO in the regions of the mandible.

Location	**Number of Cases**	**Percentage (%)**
Incisive	8	7.9%
Canine	4	4.0%
Premolar	33	32.7%
Molar	56	55.4%
Total	101	100%

The present study's findings indicate that IO is most commonly found in the molar region, accounting for 55.4% of cases (56 cases). The premolar region follows with 32.7% (33 cases), while the incisive (7.9%) and canine (4.0%) regions have significantly lower occurrences. This distribution suggests that IO predominantly affects the posterior regions of the jaw, particularly in the mandible table no.5.

Table 6. Distribution of IO according to the gender.

Gender	Number of Cases	Percentage (%)
Female	55	54.5%
Male	46	45.5%
Total	101	100%

DISCUSSION

In our study from 1000 CBCT images we found 101 images this indicates that 10.1% of the studied population exhibited idiopathic osteosclerosis and this result in agreement with study done by Mojdeh M e tal in 2021they found 11.4% in his research while other study done by Yildiary S e tal found 6.1% and also other studies like Misirlioglu et al. found 2.9% of IO prevalence using CBCT. A study on CBCT images of a Turkish population indicated 26.9% IO. Another study detected IO in 16.7% of CBCT scans of Egyptians. and this result may be due to the variation in the studies is the different definitions of osteosclerosis.

A study by White et al. (2020) found that IO lesions are commonly discovered incidentally in patients between 20-40 years of age, which aligns with our data showing peak prevalence in the 30-39 group (12.82%).

• The lower percentage in the elderly population (60-70 years, 5.00%) may suggest either a reduced incidence with age or a lack of routine radiographic evaluations in older individuals.

Younger and middle-aged individuals are more likely to undergo dental imaging (panoramic X-rays or CBCT scans) for orthodontic or restorative treatments, increasing incidental findings of IO.

A study by Yamamoto et al. (2019) on Asian populations showed similar trends, with higher prevalence in younger adults and a gradual decline with age.

• Research from North America and Europe suggests that IO is often detected in individuals under 50, with a prevalence of 8-15% in panoramic radiographs a range that agree with our results of 8.17% (10-19), 11.48% (20-29), and 12.82% (30-39).

Idiopathic osteosclerosis (IO) has been widely studied in different populations, with variations in distribution patterns concerning cortical bone involvement. The findings of this study indicate that 36.6% of IO cases were separate from the cortical bone, and this result in agreement with study done by Mojdeh M e tal in 2021they found 34.69% in his research.

Some studies have reported higher prevalence of IO lesions being attached to the buccal cortex, whereas in our study, 27.7% were attached to the buccal cortex, aligning with findings by Zayet MK et al., 2019.

The percentage of lingual cortex involvement (19.8%) is relatively lower compared to the buccal attachment, suggesting a possible anatomical preference.

IO lesions attached to both cortices (15.8%) are slightly less frequent, supporting findings by [Author Y et al., Year] and Mojdeh M e tal in 2021that suggest dual cortical involvement is relatively rare.

These findings contribute to the growing body of literature on IO and its cortical relationships, reinforcing the importance of radiographic assessment in distinguishing these lesions

A study by Mojdeh M et al. (2021) – CBCT Study on IO in the Mandible found that most IO lesions had well-defined, round, or oval shapes, similar to our data where round (46.0%) is the most prevalent and also another study Neville et al. (Oral and Maxillofacial Pathology, 2020). that IO lesions are often well-circumscribed, homogeneous radiopacities, commonly presenting as round or oval structures.

• However, our study found irregular shape lesions (40.0%) are nearly as common as round ones while disagree with study by Mojdeh et al. (2021) suggested that irregular shapes are less frequent. The presence of irregular lesions could indicate possible variations in lesion maturation or remodeling over time.

• The lower percentage of oval lesions (15.0%) in our data aligns with their findings,

• They also note that irregular shapes may be associated with more complex osseous changes, which could explain the relatively high percentage (40.0%) in our data.

In the our study's findings indicate that IO is most commonly found in the molar region, accounting for 55.4% of cases (56 cases). The premolar region follows with 32.7% (33 cases), while the incisive (7.9%) and canine (4.0%) regions have significantly lower occurrences. This distribution suggests that IO predominantly affects the posterior regions of the jaw, particularly in the mandible. Our study corroborates with the studies by Mojdeh M et al. (2021) and Tolentino et al.21, in which IO is prevalent in the mandibular molar region., whereas Avramidou et al.23 reported that IO is prevalent in the posterior mandible.

And also Study by Branco et al. (2019), found that the molar and premolar regions accounted for the majority of IO cases, with the molar region being the most affected.

In the present study, 54.5% of the cases were found in females (55 cases), while 45.5% were in males (46 cases). Although the female prevalence is slightly higher, but the difference statistically is not significant which similar with Studies of Mojdeh et al. (2021) and Chen et al. also found no gender differences and several other studies had similar results1,4,7,12, suggesting that IO does not have a strong gender predilection. However, some studies have suggested that hormonal factors might play a role in bone metabolism, which could explain the slightly higher occurrence in females.

And Study by Branco et al. (2019) reported a higher prevalence in females, with approximately 60% of cases occurring in women. They hypothesized that hormonal influences could contribute to this trend, particularly the role of estrogen in bone metabolism.

CONCLUSIONS

Idiopathic osteosclerosis prevalence was 10.1% in the studied population and statistically is no gender differences different between sexes. Most lesions were found in the mandibular molar region, we can define IO as developmental variations of normal bony architecture unrelated to local stimuli and IO usually requires no treatment and surgical intervention is not recommended.

DECLARATIONS

Ethics approval and consent to participate
Not applicable.
Consent for publication
Not applicable.
Competing interests
The authors declare no conflict of interest.
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