



## Palatine Tonsilloliths: A Retrospective Study on 500 Digital Panoramic Radiographs

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### ABSTRACT

**Aim:** This study aimed to investigate palatine tonsilloliths in the Lebanese population via digital panoramic radiographs.

**Materials and methods:** Digital panoramic radiographs of a sample of 500 Lebanese adult patients (281 females and 219 males) with an average age of 47.9 years were included in this study and assessed for tonsilloliths. The IBM® SPSS® (IBM, Armonk, NY, USA) version 20.0 for Windows was used to carry out statistical analysis of the data collected.

**Results:** Tonsilloliths were found in 7.2% of cases (36 out of 500; belonging to 18 females and 18 males). Among these, 13 cases were on the right side, 12 on the left side and 11 were bilateral. Affected patients' age ranged from 24 to 84 years (mean of 61 years). There was no statically significant relation between tonsilloliths presence and gender, while a low positive correlation was observed between tonsilloliths and age ( $r = 0.193$ ).

**Conclusion:** Palatine tonsilloliths may be discovered fortuitously on panoramic radiographs utilized regularly in dental offices; their incidence increases with age.

**Clinical significance:** Panoramic radiographs may have a beneficial role in detecting palatine tonsilloliths sometimes connected to unpleasant symptoms such as non-specific chronic halitosis.

**Keywords:** Lebanese, panoramic, population, radiography, tonsillolith

**Palatine Tonsilloliths:** A retrospective study on 500 digital panoramic radiographs

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**Conflict of interest:** None

### INTRODUCTION

Tonsilloliths are calcified masses that develop within the thickness of the tonsils and other parapharyngeal soft tissues.<sup>1</sup> They occur as a result of dystrophic calcifications due to chronic inflammation of the tonsils, mainly the palatine ones.<sup>2,3</sup>

Tonsilloliths may be single or multiple, uni- or bilateral and usually of small size.<sup>2</sup> These are deposits of calcium salts, mostly calcium phosphate, bacteria, and other materials, including dead cells and mucus.<sup>2</sup>

Generally, the patients presenting tonsilloliths do not present clinical signs; however, they might at some instances complain from constant irritation of the throat with a persistent cough, non-specific chronic halitosis, dysphagia, otalgia, etc.<sup>2,4</sup>

Given the fact that they are mostly asymptomatic, these lesions may be discovered incidentally on panoramic radiographs.<sup>1,2</sup> Because of the angulation of X-ray projection, the image shows several small opaque structures superimposed at the level of the mid-height of the ramus (Figs 1 and 2).<sup>1,2,4-8</sup>

Radiological differential diagnosis includes lesions that are radiopaque and located within the mandibular ramus, such as calcifications in the carotid artery, calcified lymph nodes, sialolithiasis within the parotid gland and calcification of the stylohyoid ligament.<sup>1,5</sup>

In panoramic images, carotid artery calcifications are located posteroinferiorly to the angle of the mandible close to the third and fourth cervical vertebrae,<sup>9</sup> the

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calcified lymph nodes are commonly found near or below the mandibular angle and the calcification of the stylohyoid ligament extends from the mastoid process to the hyoid bone.<sup>1,6</sup> As for sialolithiasis, they are more frequent in the submandibular gland (80% to 90%) than the parotid gland.<sup>1,10,11</sup>

Accurate diagnosis is obtained through computed tomography displaying the real location of tonsilloliths between the palatopharyngeus and palatoglossus muscles.<sup>12</sup>

The majority of tonsilloliths do not require any specific treatment. However, large symptomatic calcifications may be superinfected causing peritonsillar abscess and need to be removed surgically (enucleation or even tonsillectomy).<sup>2,13-16</sup>

Since there are no radiological studies investigating palatine tonsilloliths in Lebanon, this study aimed to evaluate this type of calcifications in a Lebanese sample through digital panoramic radiographs.

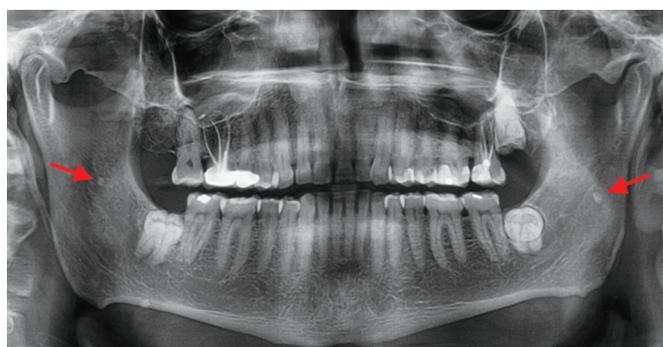
## MATERIALS AND METHODS

In a retrospective study, we examined 500 archived digital panoramic radiographs of Lebanese adults (219 males and 281 females) taken originally for dental and oral indications in a specialized maxillofacial imaging center located in Beirut, Lebanon.

All images were acquired using the Pax Zenith digital panoramic unit (by Vatech, Korea). The unit parameters were calibrated at 6 to 10 mA and 60 to 90 kV, with an exposure time of 10 to 20 seconds.



**Fig. 1:** Panoramic radiograph showing multiple unilateral radiopacities, projected over the ramus



**Fig. 2:** Panoramic radiograph showing single bilateral radiopacity, projected over the ramus

Exclusion criteria comprised patients younger than 18 years and radiographs with bad-quality.

One experienced investigator, who is an oral and maxillofacial radiologist having more than 20 years of experience, carried out the evaluation; he assessed the radiographs on the same monitor over five sessions separated by one month. To reduce the errors, 50 images were randomly chosen and rechecked twenty days later.

The tonsilloliths were identified as small ill-defined radiopaque structures superimposed over the ramus (Fig. 3).

Statistical analysis was carried out using SPSS<sup>®</sup> version 20.0 for Windows (IBM<sup>®</sup>, Armonk, NY, USA). Descriptive statistics of tonsilloliths connected to age and gender were elaborated. Relationships were evaluated with Chi-square test and Spearman correlation coefficient. Results were considered statistically significant when  $p < 0.05$ .

## RESULTS

The studied sample was composed of 500 subjects (219 males and 281 females) with ages between 18 and 88 years (mean of 47.9).

Tonsilloliths were seen in 36 cases (7.2%) of the study population (18 females and 18 males). Among these, 13 cases (9 females and 4 males) were found on the right side, 12 cases (6 females and 6 males) on the left and 11 cases (3 females and 8 males) were found bilateral (Graph 1).

Upon evaluating the connection existing between gender and tonsilloliths by chi-Square test, no statistical significance was found ( $p = 0.4$ ).

Concerning age, the affected patients' age ranged from 24 to 84 years, with a mean of 61 years (Graph 2).

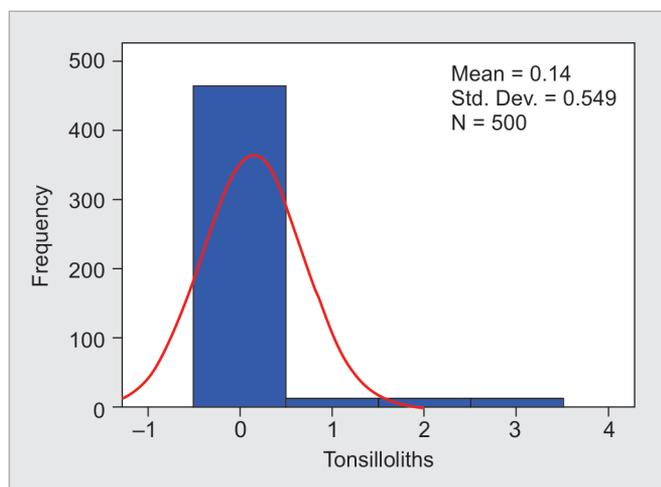
Spearman analysis resulted in a low positive correlation between tonsilloliths and age ( $r = 0.193$ ).

## DISCUSSION

Head and neck calcifications of soft tissues are relatively frequent. They are usually fortuitously detected on routine panoramic radiographic examination. Calcifications'



**Fig. 3:** Panoramic radiograph showing the palatine tonsilloliths



**Graph 1:** Frequency of palatine tonsilloliths in the studied sample (0: absence, 1: right side, 2: left side, 3: bilateral formation)

shape, number, distribution, and localization are key diagnostic factors to be considered.<sup>17,18</sup>

Among these calcifications are tonsilloliths, which are calcified structures that form in the oropharyngeal airway space, more specifically in the crypts of the palatine tonsils.<sup>2,4,6</sup>

Radiologically, tonsilloliths present as irregular radiopacities in the area of the ascending ramus.<sup>19</sup>

In the literature, a small number of studies investigated tonsilloliths using panoramic radiographs;<sup>2,7,20</sup> the majority used CT in their examination.<sup>4,8,19-21</sup>

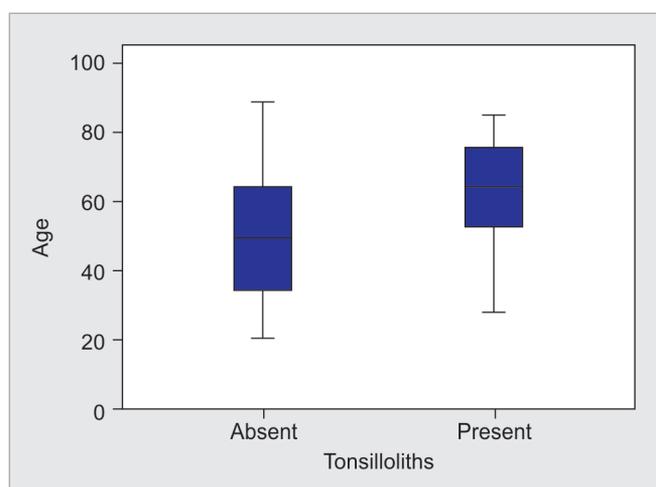
In our study conducted on Lebanese adults using digital panoramic radiographs, the prevalence of tonsilloliths was found to be 7.2%. This result appears similar to what was reported by Bamgbose et al.<sup>7</sup> (8.14%) and Oda et al.<sup>20</sup> (7.3%) who adopted the same assessment's technique. However, a difference is noticed when comparing those results with the findings of CT-based studies.

In fact, the detection rate of tonsilloliths was relatively high in the studies of Fauroux et al.<sup>21</sup> (24.6%) and Aspetrand and Kolbenstvedt<sup>22</sup> (16%) who examined CT images.

Nowadays, the technological improvement of imaging techniques, such as CT provides more details and consequently better evaluation. Thus, many studies propose that the incidence of tonsilloliths is underestimated with the use of panoramic radiographs alone.<sup>20-22</sup>

Oda et al. evaluated the prevalence of tonsilloliths with both panoramic radiographs and CT images and found it 7.3% and 46.1%, respectively; they attributed this finding to the degree of calcification, size, and number of tonsilloliths that render them sometimes undetectable by a two-dimensional (2D) radiography.<sup>20</sup>

Nevertheless, despite that CT images seem to exhibit better capability than panoramic radiographs in detecting



**Graph 2:** Association between age and palatine tonsilloliths

tonsilloliths, the importance of using panoramic radiographs lies in the fact that they still occupy a part of the systematic examination of patients present for everyday treatment since CT is not a routine radiologic investigation, and, hence, its systematic use without an indication is unjustified and against patient safety recommendations.

In our sample, we found a positive low correlation between age and tonsilloliths with an average of 61 years. In the literature, the conclusions on the connection between the incidence of tonsilloliths and age were contradictory; for some investigators it was positive,<sup>20,23</sup> for others it was not.<sup>21,24</sup>

On the other hand, contrary to the female predominance reported by Aspetrand and Kolbenstvedt,<sup>22</sup> there was no significant connection between tonsilloliths and gender in our study ( $p = 0.4$ ). Our result corroborates the ones of Bamgbose et al.,<sup>7</sup> Oda et al.,<sup>20</sup> and Fauroux et al.<sup>21</sup>

Finally, some limiting factors existing in our study are (a) a larger sample would render results more precise since our studied radiographs were relatively limited; (b) the evaluation was not done on three dimension (3D) images, which would be, subsequently, of interest and resulted in more precision.

## CONCLUSION

Palatine tonsilloliths may be fortuitously discovered on panoramic radiographs taken regularly in dental practice. Clinicians should think about these entities in front of radiopaque lesions with ill-defined borders superimposed on the ramus.

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