

## Original Research

### Digital Panoramic Radiograph- A Screening Aid in Detection of Soft Tissue Calcifications: A Retrospective Study

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#### ABSTRACT:

**Background:** Incidental finding on radiographs may help in identifying other changes apart from the diagnostic purpose of the image. Calcification of soft tissue would be one such findings. The purpose of this article is to study the efficacy of panoramic radiographs as a screening aid in detection of soft tissue calcifications. **Materials and methods:** 1029, Digital panoramic radiographs of patients aged between 30 and 70 years, from the year 2016 available on the out patient records of the Department of Oral Medicine and Radiology were selected. Soft tissue calcifications were recorded according to the anatomic site, shape. **Results:** Among 1029 digital radiographs viewed for calcifications, 620 were male and 409 were female. Various soft tissue calcifications are viewed which include carotid artery calcification (46.91%), stylohyoid ligament (6.7%), tonsillolith (31.1%), lymphnode (2.2%). The association of presence of calcification with age and gender was analyzed with the Chi-square test. ( $p > 0.05$ ) **Conclusion:** Incidental findings of soft tissue calcifications on panoramic radiograph help in early referral for investigation which could potentially decrease the morbidity and mortality especially in case of carotid artery calcification.

**Key words:** Panoramic radiography, Carotid atherosclerosis, Soft tissue calcification, Diagnostic.

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#### INTRODUCTION

Incidental finding on radiographs may help in identifying other changes apart from the diagnostic purpose of the image. Calcification of soft tissue would be one such findings. Calcification is the accumulation of calcium salts in a normal body. It is essential in the formation of bone, but calcium can be deposited abnormally in soft tissue in unorganized manner (heterotopic). This deposition leads to hardening of soft tissue which makes this soft tissue appear radiopaque on radiographs.

The ability of panoramic radiograph to record the entire maxilla – mandibular region on a single film made it a valuable diagnostic tool.<sup>1</sup> Previous studies have shown

that soft tissue calcifications can be identified on panoramic radiographs.<sup>2</sup> The incidence of carotid artery calcification on panoramic radiographs was first found by Friedlander and Lande and suggested that the panoramic image may help in detecting patients at risk of stroke.<sup>3</sup> With this in account, many studies have been carried out to determine the incidence of CCA on panoramic radiographs. Case reports presenting carotid artery calcifications on panoramic radiograph have also been published and reported that carotid calcification can be predicted by panoramic radiograph.<sup>4,5</sup> Hence the aim of my study is to study the efficacy of panoramic radiographs as a screening aid in detection of soft tissue calcifications. The objective is to study soft tissue

calcifications in males and females, the prevalence of arteriosclerosis and carotid artery atheromas, and also the prevalence of tonsillolith, sialolith, phlebolith, lymph node, stylomandibular ligament, stylohyoid ligament and any other soft tissue calcifications seen on digital panoramic radiographs.

**MATERIALS AND METHOD**

1000, Digital panoramic radiographs of patients taken on PLANMECA Proline XC which were available on the out patient records of the Department of Oral Medicine and Radiology were selected. Radiographs of patients aged between 30 and 70 years, from the year 2016 were included. Radiographs with poor quality, major errors, positional errors and also panoramic radiograph of known skeletal and calcification disorders from the available out patient record were excluded from the study.

For analyzing the panoramic radiographs, 5 vertical lines were drawn, 2 along the posterior aspect of the ramus on both sides, 1 along the center and 2 other additional vertical lines drawn in between them. Accordingly, each radiograph

was divided into 12 boxes and numbered from 1 to 12. (figure-1) Considering their anatomical site and the box in which radiopacities appeared, calcifications were recorded. (table 1) The data was entered in microsoft excel and statistical analysis was done using chi square test.

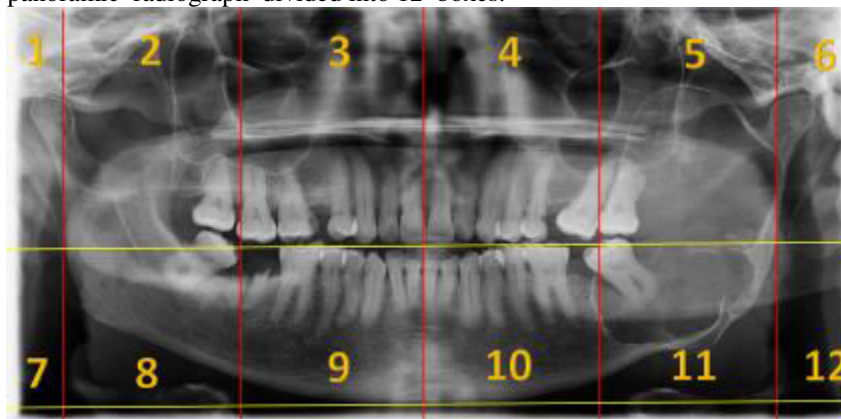
**RESULTS**

All the 1029 digital panoramic radiographs were viewed for calcification. The data was entered in microsoft excel. All the radiographs were rechecked by 2 trained maxillofacial radiologist with an experience of 5 years. Totally 1029 digital radiographs were viewed for calcifications, 620 were male and 409 were female. In which 57 radiographs were identified with calcifications. Out of 57 radiographs with calcifications, 45 were soft tissue calcifications and 12 were bony calcifications. Among 45 (4.37%) soft tissue calcification radiographs, 25 were male and 20 were female. In our study five soft tissue calcifications were noted. (Figure 2 & 3) The association of presence of calcification with age ( $p > 0.736$ ) and with gender ( $p > 0.255$ ) was non-significant.

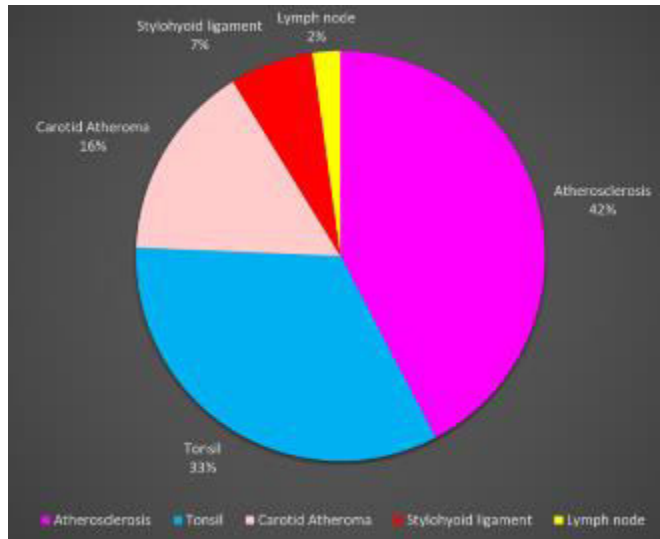
**Table 1.** Soft tissue calcification<sup>6,7</sup>

Calcification	Radiographic features	Box No
Rhinolith	Radio opaque mass	Medial aspect of 3 <sup>rd</sup> or 4 <sup>th</sup> box
Antrolith	Radio opaque mass	Maxillary sinus in 3 <sup>rd</sup> or 4 <sup>th</sup> box
Phlebolith	Multiple round or oval calcified bodies giving a bulls eye or target appearance	8 <sup>th</sup> or 11 <sup>th</sup> box.
Arteriosclerosis	Mural calcification outlines that had a straight/tortuous path involving the facial artery or the Carotid artery.	8 <sup>th</sup> or 11 <sup>th</sup> box
Tonsillolith	Unilateral and multiple small radiopacities clusters superimposed over the mid ramus region.	2 <sup>nd</sup> or 5 <sup>th</sup> box
Sialolith	Single or multiple, cylindrical and very smooth in outline, and in the hilus, when they appeared larger and more irregularly shaped.	2 <sup>nd</sup> or 5 <sup>th</sup> box
Calcified stylohyoid ligament	A linear ossification extending forwards from the region of the mastoid process and crossing the postero-inferior aspect of ramus toward the hyoid bone.	From 6 <sup>th</sup> box to 11 <sup>th</sup> box or 1 <sup>st</sup> to 8 <sup>th</sup> box
Calcified lymph node	Radio opaque mass	8 <sup>th</sup> or 11 <sup>th</sup> box
Calcified atherosclerotic plaques	Heterogenous radiopacity visible in the external carotid vasculature, superior or inferior to the greater horn of hyoid bone in the level of C3 & C4 or the intervertebral space between them.	8 <sup>th</sup> or 11 <sup>th</sup> box

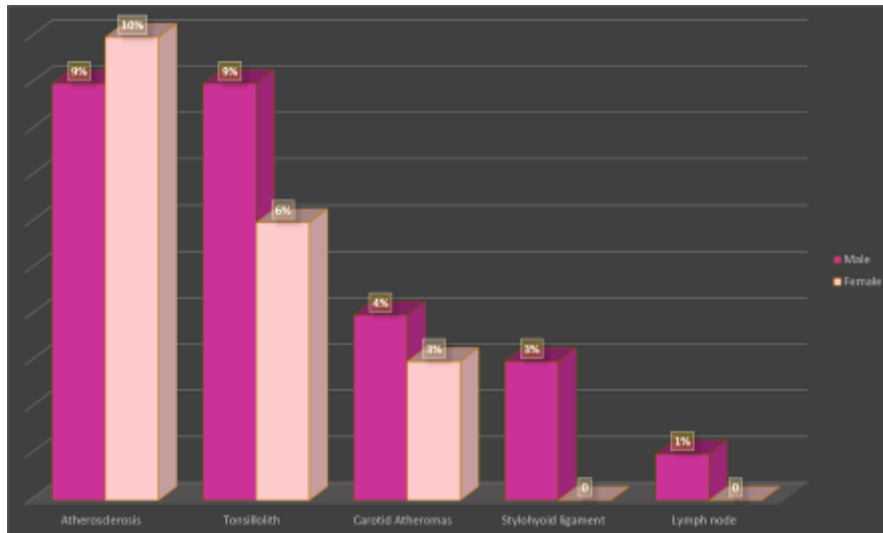
**Figure 1 :** Digital panoramic radiograph divided into 12 boxes.



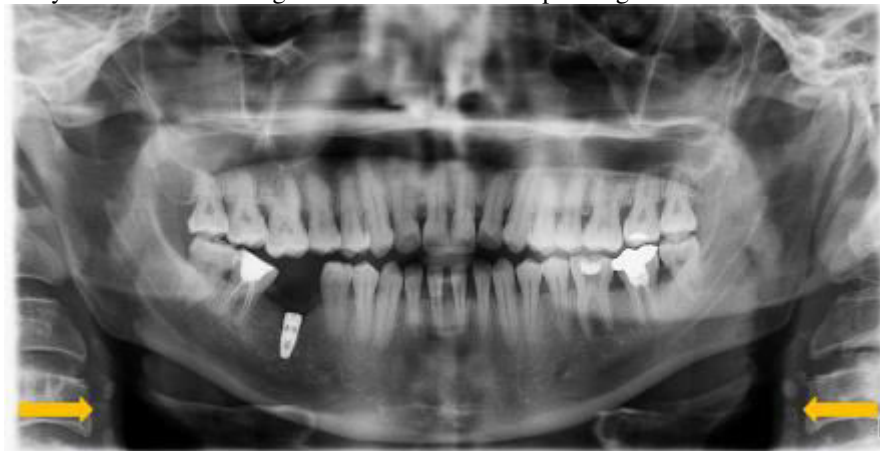
**Figure 2:** Distribution of soft tissue calcifications



**Figure 3:** Distribution of calcifications in male and female.



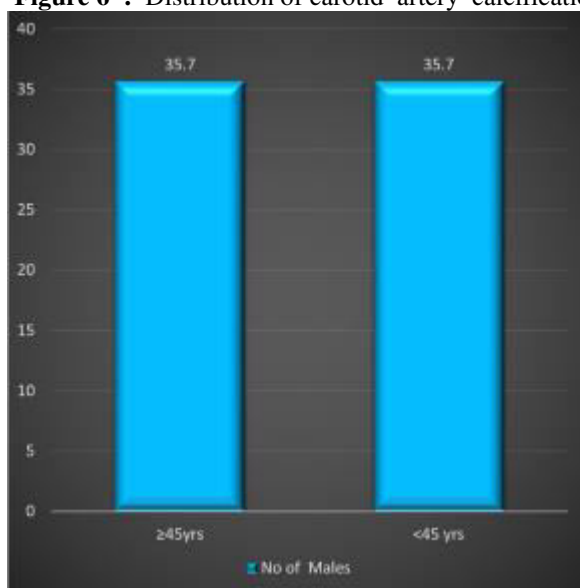
**Figure 4:** Carotid artery calcification in right and left side corresponding to C3



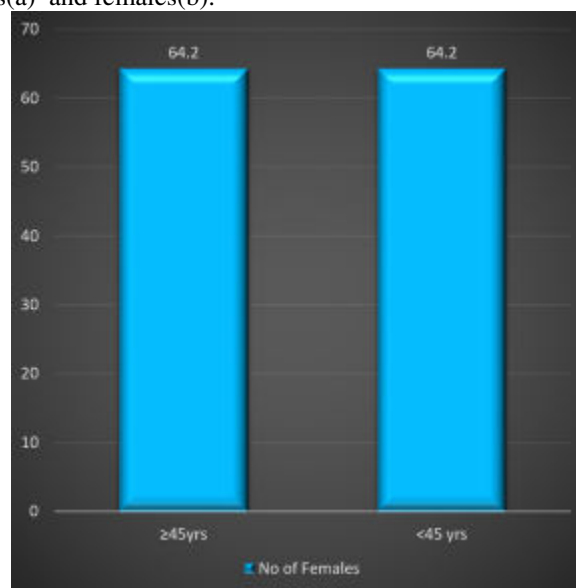
**Figure 5:** Calcification of right and left tonsil.



**Figure 6 :** Distribution of carotid artery calcification in males(a) and females(b).



6(a)



6(b)

**DISCUSSION**

Calcification can manifest itself in many ways in the body depending on the location. Calcification of soft tissue (arteries, cartilage, heart valves etc.) can be caused by vitamin K<sub>2</sub> deficiency or by poor calcium absorption due to a high calcium/vitamin D ratio. This can occur with or without a mineral imbalance.

In our study we detected higher prevalence of soft tissue calcifications (4.37%) as compared to previous study done by Garayet al<sup>8</sup> (2.61%). In study by Vengalath et al<sup>6</sup> in 2014, the prevalence of calcification is high (8%) compared to our study.

In our study Carotid artery calcification (46.91%) (figure 4) was higher among the various calcifications, followed by tonsillolith (33.3%). (figure 5) Higher percentages of carotid artery calcifications were observed in older patients which concurring with Bhalla et al.<sup>9</sup> Previous studies have concluded that carotid artery calcification was

more in male compared to female. But in our study Carotid artery calcification was even for both male and female with higher incidence in age group above 45 years. (figure 6(a) & (b)) The exact cause of carotid artery calcification is unknown but the risk factors include abnormal cholesterol levels, high blood pressure, diabetes, smoking, obesity, family history, and an unhealthy diet. Atherosclerosis is asymptomatic until enough narrowing or closure of artery occurs. Most of the time patient realize that they have disease only when they experience other cardiovascular disorders. So in this way panoramic radiographs helps as a screening aid in patients with unknown symptoms.

In our study, tonsillolith was found both in younger and older age group which is according to Garay et al<sup>8</sup> in 2014. Tonsillolith is a dystrophic calcification which result from chronic inflammation of the tonsils. In general, it is rare, asymptomatic, more often in older age groups, displaying several shapes and no sex preference.

Tonsillolith should not be confused with myosites ossification, which is rare and common in masseter. This is 2- 4 cm in diameter which is radiolucent initially and later radiopaque with central radiolucency.<sup>10</sup>

In our study when viewing for soft tissue calcification we also noted some bone calcification which accounts for about 1.16%.

**CONCLUSION:** Panoramic radiographs which is a two dimensional representation of a three dimensional object nowadays became a routine diagnostic investing aid. The eyes see only what the mind knows, so the dentist should have a clear detail about the soft tissue calcification because Detection is important to orient the diagnosis and prevention of disease. Hence, the current study conclude that panoramic radiograph can be a screening aid in investigations of soft tissue calcification.

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