Original Article

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PREVALENCE OF SOFT TISSUE CALCIFICATIONS ON DIGITAL PANORAMIC RADIOGRAPHS IN MARATHWADA POPULATION: A RETROSPECTIVE STUDY

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ABSTRACT:

Aims and Objectives: To determine the prevalence of visible calcifications in soft tissues of the orofacial region in digital panoramic radiographs in Marathwada population.

Materials and Methods: Panoramic radiographs of 300 male and female dental outpatients who had visited the dental college for various dental treatments were scrutinized for calcifications. Soft tissue calcifications were recorded according to gender, age, and site in the age range of 10 to 79 years and analyzed for incidental findings, which were not related to the primary purpose of the radiograph.

Results: Patients identified with soft tissue calcifications comprised 40 out of 300 patients (13.3%) ,Males were 26 (8.67%) while females were 14(4.66%), soft tissue calcifications comprised highest prevalence of tonsilloliths 27 (9%) , carotid calcification 12(4%) ,sialoliths 1(0.3%). The association of the presence of calcification with age was analyzed with the Chi-square test ($P<0.05$).Men showed an increased prevalence of soft tissue calcification than women.

Conclusion: Tonsilloliths were found to be high among the soft tissue calcifications and men were shown a high prevalence of soft tissue calcification than female.

Keywords: panoramic radiography, prevalence, soft tissue calcifications, tonsillolith, carotid artery calcification, sialoliths.

INTRODUCTION:

Prior to initiating any dental treatment, dental professionals are expected to take a detailed medical and dental history and perform a comprehensive clinical examination of the hard and soft tissues of the craniofacial complex. Additional diagnostic tools may include extraoral radiographic examination, which classically includes panoramic radiographic imaging. Imaging techniques play a major role in the diagnosis and management of many patients.(1)

Panoramic radiography provides easy observation of pathology and dental anomalies in the oral and maxillofacial region, besides having occasionally directed to discover some incidental findings other than those involved in a patient's primary complaint. The probability that a dentist can make incidental findings of pathology or anomalies in a patient will be high if he/she has a special interest on the subject, because in many cases, such findings may require medical or

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odontological management. Also, it is evident that early detection of dental anomalies may help to prevent oral diseases or dental anomalies.[2] Pathologic calcification of soft tissues occurs when calcium salts, essentially calcium phosphate, are deposited in an unorganized fashion in soft tissue (heterotopic calcification). There are three types of heterotopic calcification:

1) Dystrophic calcification which occurs in degenerating and necrotic tissues, soft tissue damage caused by trauma, inflammation, injections, the presence of parasites, changes arising from disease and calcifications localized to the site of injury, despite normal serum calcium and phosphate levels.

2) Metastatic calcification results when calcium salts are precipitated in normal tissue as a result of abnormally high levels of blood calcium or phosphate, which usually occurs bilaterally and symmetrically.

3) Idiopathic calcification (calcinosis) in normal tissue despite normal blood calcium level.[3,4,5]

Calcification of various structures located in the head and neck region is detected accidentally on panoramic radiographs (OPGs) during the routine examination of patients seeking dental care. Tonsilloliths are dystrophic calcifications as a result of chronic inflammation of tonsils. Calcifications were identified as tonsilloliths if they appeared as unilateral and multiple small radiopacities clustered together over the oropharyngeal airspace, with or without overlapping the ramus.Calcification was identified as sialolith in the duct of the submandibular gland when it appeared cylindrical and very smooth in outline, single or multiple in number, and in the hilus, when they appeared larger and more irregularly shaped. Carotid artery Calcification was identified when visible calcifications in the external carotid vasculature, superior or inferior to the greater cornua of the hyoid bone and adjacent to the cervical vertebra, C3, C4 or the intervertebral space between them.[6] The goal of the present study is to assess the frequency and nature of incidentally detected soft tissue calcifications by examining the panoramic radiographs of patient, unrelated to the chief complaint for which the radiograph has been advised

Aim of the study :

The aim of the present study is to examine incidental findings of soft tissue calcifications by examining the panoramic radiographs of the patient.

Objectives of the study:

1.To estimate the prevalence of soft tissue calcifications seen in digital OPGs.

2.To estimate and compare the prevalence of calcifications in males and females.

3.To evaluate the incidence of tonsillolith, carotid artery calcification, and sialolith, seen in digital OPGs.

MATERIALS AND METHODS:

Digital panoramic radiographs, taken on PCH-(2500) VATECH machine of 300 dental outpatients reporting to the Department of Oral Radiology from different specialty departments of dental college for their respective chief complaints. The radiographs were of 179 males and 121 females. The patients with hyperparathyroidism, malignancy, and renal failure were excluded from the study. All the rest of the patients were included. All the radiographs were scrutinized for calcifications. Panoramic radiographs were examined to detect carotid artery calcifications appearing as heterogeneous radiopacities in a verticolinear orientation adjacent to the hyoid bone, epiglottis and the cervical vertebrae either above or below the intervertebral space between C3 and C4 (Fig. 1). On the panoramic radiograph, the most common appearance of tonsilloliths is a cluster of multiple, small, ill-defined radiopacities slightly more radiopaque than cancellous bone, similar to cortical bone. A cluster of multiple, small, ill-defined radiopaque mass adjacent to the bone at or below the mandibular angle were diagnosed as tonsillolith.(Fig 2) Calcification was identified as sialolith in the duct of the submandibular gland when it appeared cylindrical and very smooth in outline, single or multiple in number, and in the hilus, when they appeared larger and more irregularly shaped.(Fig-3). Images were viewed in a darkened room on computer with 17-inch LCD monitors with the same screen resolution.This was hospital-based complete two-year observational radiographic study. These incidental findings were categorized and analyzed using descriptive statistics.

RESULTS:

All the radiographs were taken in a digital radiographic unit. The data were entered into Microsoft Excel. Out of the 300 patients whose radiographs were viewed for evidence of calcification the number of radiographs with evidence of calcification was 40 (13.3%). Out of 40 positive panoramic radiographs of soft tissue calcifications, 26 (8.67%) were males and 14 (4.66%) were females. A total of 40 (13.33%) panoramic radiographs revealed soft tissue calcifications, out of which highest prevalence showed in tonsillolith 27 (9%) [graph-1] followed by carotid calcification 12 (4%) [graph-2] and sialolith 1 (0.3%)[graph-3]. For statistical analysis chi-square test and Fisher exact test was used. Age-wise distribution of soft tissue classification showed non-statistically significant results (0.78). Gender-wise there was also no statistically significant difference (0.39). The prevalence of tonsillolith & carotid calcifications was observed in the age group of 30-39. Only a single case of sialolith was observed in the same age group.

DISCUSSION:

Panoramic radiographs are the most commonly prescribed imaging modality. While examining panoramic radiograph, dentists tend to focus on analyzing the

dentition and the common pathologies that affect the teeth such as caries, periodontal disease, malocclusions and impacted teeth. While less analysis is done for the structures around the dentition, in part because of the focus on the radiograph is in the area of the patient's chief complaint only. Soft tissue calcifications are common in OPGs, but they are most commonly detected incidentally as they do not cause any signs or symptoms.In our study 40 (13.33%) panoramic radiographs out of 300, showed some form of soft tissue calcification, such as carotid artery calcifications, tonsillolith & sialolith.

Similar studies regarding incidental findings of soft tissue calcification have reported the prevalence to be 1.9% by Avsever et al.[7] and 8.2% by Jadu et al.[8] while 2.61% by Garay et al.[9] The prevalence of soft tissue calcification in our study was more as compared to these studies But it is in accordance with Garay et al.[9] & Bamgbose et al.[10] where the prevalence of tonsilloliths was more among soft tissue calcification.

Tonsillolith was the most prevalent finding among soft tissue calcification in our study. We found 27 (9%) panoramic radiographs (19 male & 8 female) showing evidence of tonsilloliths. Some studies regarding the prevalence of tonsilloliths by Aghdasi et al,[11] Oda et al [12] and Ghabanchi et al.[13] have reported that men were more likely to develop tonsilloliths which were similar to the finding of our study. In our study, most of the tonsilloliths were observed in the age group of 30-39 which was in contrast with Aghdasi et al.[11] where the mean age of patients with tonsillolith was reported to be 50 ± 14.1 years. The radiographic appearance of tonsilliths in this study was predominantly multiple and well-defined radiopacities in the lower one-third of the mandibular ramus area. This is a common location for tonsilliths to be identified on radiographs as the tonsils are found in the lateral aspect of the oropharyngeal wall corresponding to the angle of the mandible bilaterally. Several studies have examined the efficacy of panoramic images at detecting carotid artery calcification and numbers of articles have described these findings on panoramic radiographs with prevalence ranged from 3-15%in different patient populations. The prevalence of CACs detected in the present study fall within this range. We found prevalence evenly in 6 males and 6 females which were in contrast with the findings of Gokce et al.[14] where CACs were detected on 10 males and 16 females & Alzoman et al.[15] where CACs were detected on 21 males and 7 females. Out of 12 radiographs showing CACs, 8 radiographs showed radiopaque mass or masses on the left side, 3 on the right side and 1 on both sides. In our study, the incidence of CAC was higher on the left side which was similar to the findings reported by Bayram et al,[16] Gokce et al,[14] Alzoman et al. [15] In this study, the most prevalent age group for CACs was found to be 30-39. This finding was in contrast with most of the studies where the

prevalence was reported in the fifth and sixth decade of life.Sialolith was the least prevalent finding among soft tissue calcification in our study. A single radiograph was found to have sialolith in the current study. The low prevalence of sialolith in our study was in accordance with the similar study of Lee et al(17) where 0.1% of sialolith was reported. Garay et al.[9] evaluated the prevalence of soft tissue calcifications in which sialoliths were observed in 11% which is in contrast with our study. Some case reports have also reported the incidental finding of sialolith on panoramic radiograph which was in accordance with our finding. Mehrotra et al [18] reported a case of a 26-year-old male patient in whom the intraglandular (submandibular) sialolith was encountered incidentally on the panoramic radiograph.

CONCLUSION:

Majority of the calcifications encountered in the present sample were tonsilliths as compared with other soft tissue calcifications. It was concluded that panoramic radiography can be used as a tool to detect calcifications in case of tonsilliths. Digital panoramic radiographs can serve as economic diagnostic tools for initial diagnosis of soft tissue calcification like carotid artery calcifications,tonsiloliths and sialoliths.

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FIGURES:

Figure 1- cropped panoramic radiograph showing radiopacities in the right carotid vasculature area.
(carotid artery calcification, white arrow).

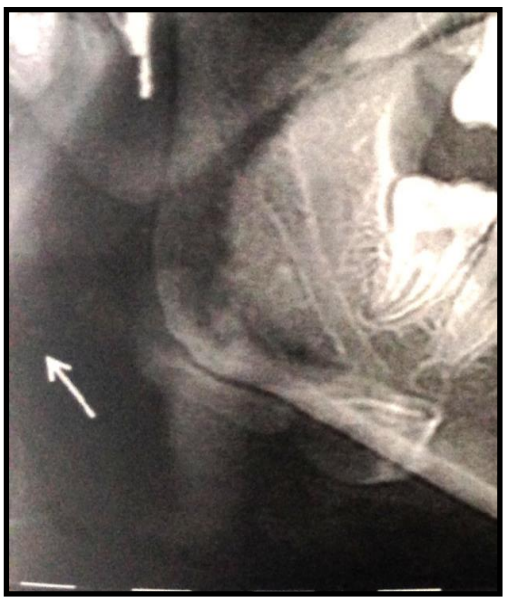


Figure 2.- cropped panoramic radiograph showing radiopaque masses superimposed over the right ramus region.(tonsillolith, white arrow).

Figure 3. - cropped panoramic radiograph showing radiopaque masses above hyoid bone beneath inferior border of mandible.(sialolith- white arrow)

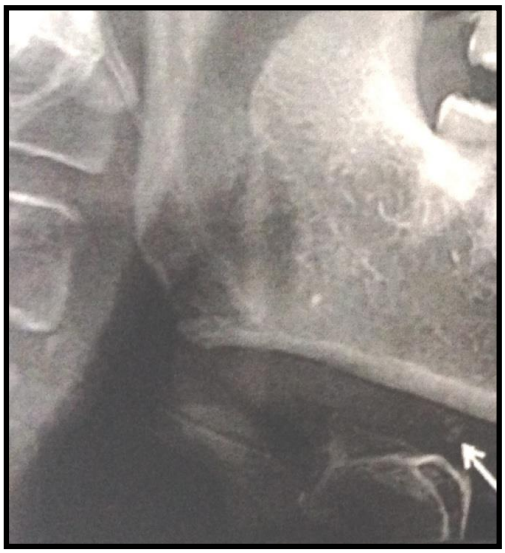


TABLE:

Table 1 - descriptive data of soft tissue calcifications among age and gender distribution (n=40)

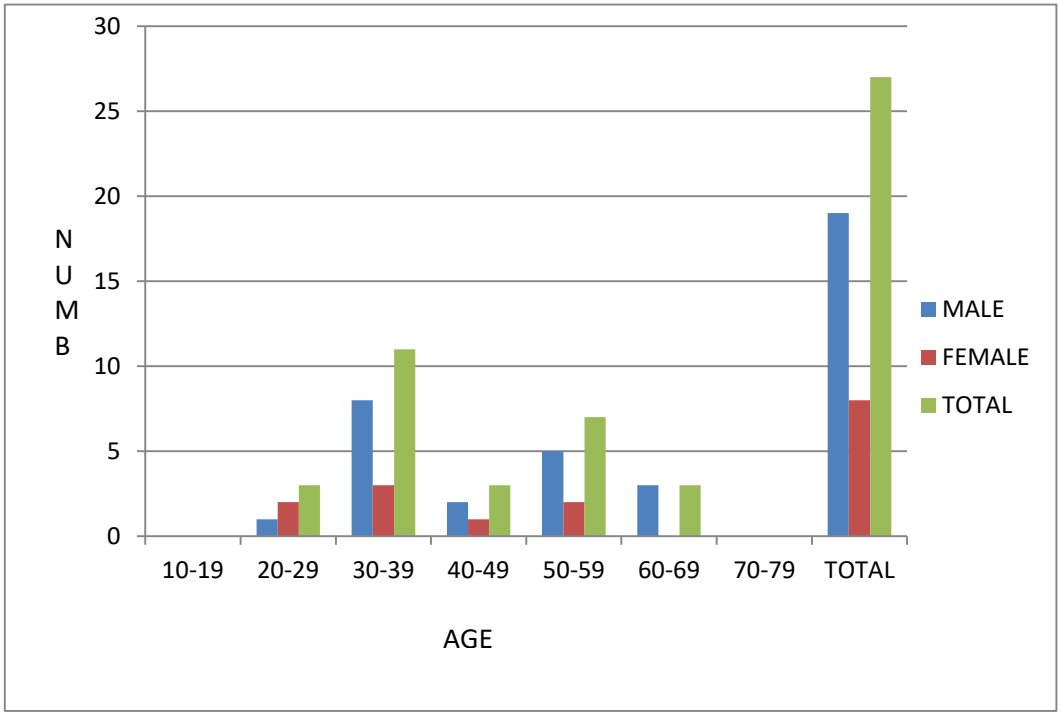
	Carotid calcification (n=12)			Tonsillolith (n=27)			sialolith (n=1)		
	males	females	total	male	female	total	male	female	total
10-19	0	0	0	0	0	0	0	0	0
20-29	0	1	1	1	2	3	0	0	0
30-39	2	2	4	8	3	11	1	0	1
40-49	0	1	1	2	1	3	0	0	0
50-59	1	2	3	5	2	7	0	0	0
60-69	2	0	2	3	0	3	0	0	0
70-79	1	0	1	0	0	0	0	0	0
total	6	6	12	19	8	27	1	0	1

Test applied –chi-square test and Fisher exact test.

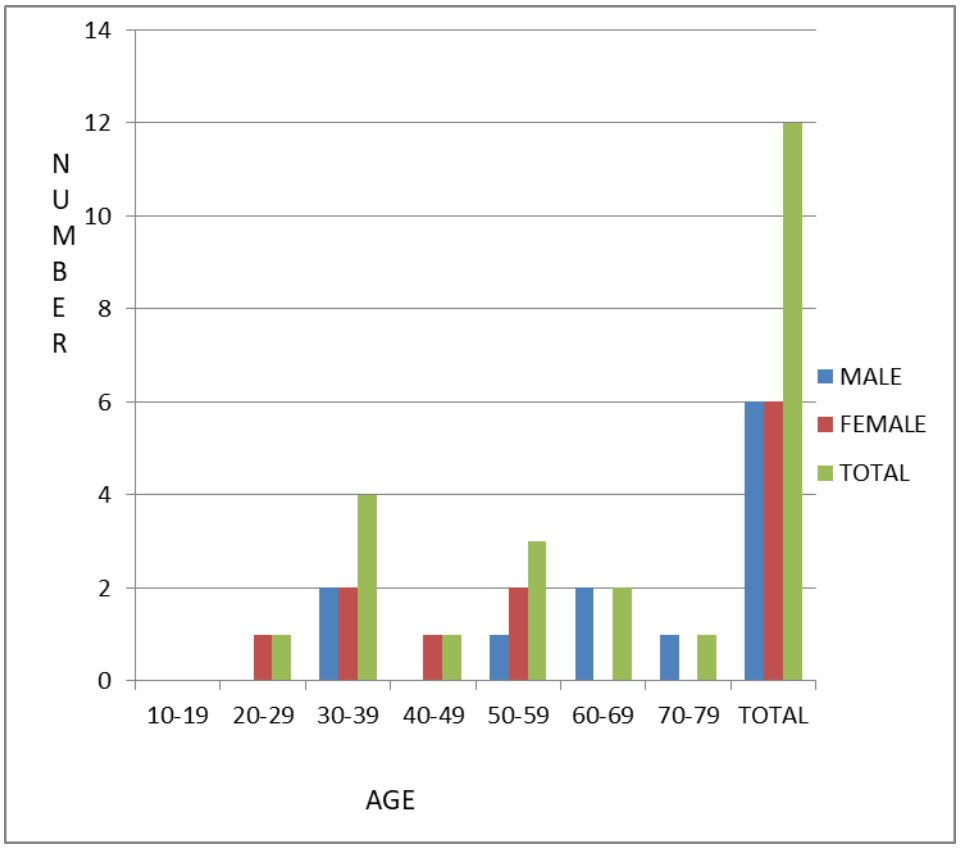
Soft tissue calcifications vs age 0.78 and vs gender 0.39

GRAPHS:

Graph 1 - descriptive data tonisillolith among age and gender distribution (n=40)



Graph 2 - descriptive data carotid artery calcifications among age and gender distribution (n=40)



Graph 3- descriptive data of sialolith among age and gender distribution (n=40)