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ABSTRACT

Introduction: Atherosclerosis is a disease of the arteries characterized by the deposition of fatty material on its wall, forming atheroma plaques, which are composed of lipids and inflammatory cells. These plaques become thick, may suffer calcification and project themselves into the vessel lumen, determining blood flow change. Aim: The aim of the present study is to determine the prevalence of common carotid artery calcifications (CCAC) detected on panoramic radiographs (PR) in a group of Saudi population living in Abha region, and main risk factors. Materials and Method: The study is based on 412 Standard digital panoramic radiographs (Figure 1) retrieved from the archival records. All the panoramic radiographs were taken between 2010 to 2018 at the King Khalid University Faculty of Dentistry, The patients with or without dental problems were older than 18 years and treated with this clinic. Results: The study population consisted of total 412, 190 of them males and 222 was females with age (range: 18–83 years) at the time of panoramic radiographs taken. Of the 412 individuals, 50 (12.2%) were detected to have common carotid artery calcifications on panoramic radiographs. The 50 individuals who had common carotid artery calcifications consisted of 22 males (41.7%) and 28 females (58.3%). Discussion: Carotid artery calcification, especially close to carotid bifurcation, can result in important vascular obstruction causing stroke. Several factors for the stroke are stratified into no modifiable and modifiable risk factors. The former are gender, age, ethnicity, and heredity, and the latter are hypertension, diabetes mellitus, hyperlipidemia, obesity, smoking, and carotid atherosclerotic disease. Conclusion: As a result, common carotid artery calcifications found as incidental findings on standard panoramic radiographs should be carefully examined in the area of the carotid artery in not only patients with systemic disease such as diabetes, renal disease etc, but also asymptomatic patients.

Keywords: Common, Carotid artery, Calcification, Detection, Panoramic radiographs
1. **INTRODUCTION**

Atherosclerosis is a disease of the arteries characterized by the deposition of fatty material on its wall, forming atheroma plaques, which are composed of lipids and inflammatory cells. These plaques become thick, may suffer calcification and project themselves into the vessel lumen, determining blood flow change (1,2,3).

Panoramic Radiographs help us to a diagnostic and detecting common carotid artery calcifications and the early diagnosis can be decrease the morbidity and mortality for subjects with common carotid artery calcifications.

Recently, number of studies have revealed the detection of common carotid artery calcifications on PRs in many populations, but, there is no enough study regarding this topic in Saudi population. The aim of the present study is to determine retrospectively the presence of common carotid artery calcifications detected on PRs in a group of Saudi population living in Abha region. Further, the relationship between common carotid artery calcifications and gender was evaluated. According to our knowledge, this is the first study done in Abha region and investigating the risk factors related to common carotid artery calcifications in the Saudi population.

Friedlander and Lande (5) were the 1st describe the presence of common carotid artery calcifications by panoramic radiographs performed in the routine dental diagnosis. Friedlander and Baker (6) noted that by panoramic radiographs can be identified asymptomatic patients at risk for stroke. Radiographically, calcified atheroma plaques are present as circular irregular or heterogeneous radiopaque masses, unilateral and bilateral, the plaques have an aspect mostly circular when small and mostly thin or linear rectangular (7,8,9). They are It is usually locate posterosuperiorly the mandible angle, approximately at the inferior margin of 3rd cervical vertebra (between C3 and C4) near the hyoid bone (2,10); however its location not limited to the hyoid or thyroid cartilage (9).

**Aim**

The aim of the present study is to determine the prevalence of common carotid artery calcifications (CCAC) detected on panoramic radiographs (PR) in a group of Saudi population living in Abha region, and main risk factors.

2. **MATERIALS AND METHOD**

The study is based on 412 Standard digital panoramic radiographs (Figure 1) retrieved from the archival records. All the panoramic radiographs were taken between 2010 to 2018 at the King Khalid University Faculty of Dentistry. The patients with or without dental problems were older than 18 years and treated with this clinic. These panoramic radiographs were taken as screening films before treatment. panoramic radiographs that were excluded because of the subject’s movements during the exposure or did not include C3 and C4 were eliminated.

All the panoramic radiographs were evaluated by 4 a undergraduate dental student. Each radiograph was viewed in subdued ambient light by using” transmitted light” from a standard view box. A radiopaque nodular mass and masses adjacent to the cervical vertebrae at or below intervertebral space between the C3 and C4 were diagnosed as common carotid artery calcifications (11). (Figure 2). Patients with unilateral or bilateral common carotid artery calcifications on these radiographs were detected. For differential diagnosis of common carotid artery calcifications, other cervical calcifications such as calcified triticeous cartilage and calcified thyroid cartilage, hyoid bone and submandibular salivary gland sialoliths were excluded according to Carter’s study (12).

![Figure 1: digital Standard panoramic view.](https://doi.org/10.24087/IAM.2018.2.1.405)
The factors related to atherosclerosis were reviewed including hyperlipidemia, hypertension, renal diseases, diabetes mellitus, cardiovascular disease, smoking etc. Any relationship between CACs and gender, age, was evaluated. The results were analyzed with SPSS 10.0 (Statistical Package for Social Science Inc., Chicago, Illinois, USA).

3. RESULTS

The study population consisted of total 412, 190 of them males and 222 was females with age (range: 18–83 years) at the time of panoramic radiographs taken. Of the 412 individuals, 50 (12.2%) were detected to have common carotid artery calcifications on panoramic radiographs. The 50 individuals who had common carotid artery calcifications consisted of 22 males (41.7%) and 28 females (58.3%). Common carotid artery calcifications were not significantly different between the males and females, carotid artery calcifications were seemed as a radiopaque mass or masses adjacent to or just upper the intervertebral space between C3 and C4 (Figure 2). These calcifications were unilateral in 34 patients (68%) and bilateral in 16 patients (32%) subjects. Of the 50 patients there were (16 bilateral) common carotid artery calcifications. Therefore, 50 common carotid artery calcifications were detected in the 34 patients, 16 (32 %) of the common carotid artery calcifications were located on the right side and 18 (36%) were located on the left side (Table 1).

### Table 1: Prevalence of CCAC identified by panoramic radiograph in the population and main risk factors.

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Total = 412 p* 50P 12.2% have CCAC* 22 P 41.7% 28 P 58.3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiographic appearance of Carotid artery calcifications</td>
<td>Side of Carotid artery calcifications</td>
<td>Size of Carotid artery calcifications (mm)</td>
</tr>
<tr>
<td>36 p 18% unilateral left</td>
<td>3 – 5 mm 42 p 84%</td>
<td>14 p 25 %</td>
</tr>
<tr>
<td>18 p 36% multiple</td>
<td>32 p 16% unilateral right</td>
<td>5 – 7 mm 4 p 8%</td>
</tr>
<tr>
<td>32 p 16% bilateral</td>
<td>7 – 9 mm 4 p 8%</td>
<td></td>
</tr>
</tbody>
</table>


The demographic and medical records of the patients with carotid artery calcifications seen on the panoramic radiographs, the medical records of 50 patients with carotid artery calcifications were analyzed for the risk factors associated with carotid artery calcifications. Table 2 shows the relationship between medical history and common carotid artery calcifications. In 50 patients with common carotid artery calcifications, 14 subjects (25%) Diabetic, 8 subjects (14.3%) Hypertensive patient and 4 subjects (7.1%) reported Anemic patient, 2 subjects (3.6%) reported cardiovascular disease patient, 2 subjects (3.6%) reported immune disease patient, as shown in figure 2.
4. DISCUSSION

Carotid artery calcification, especially close to carotid bifurcation, can result in important vascular obstruction causing stroke. Several factors for the stroke are stratified into no modifiable and modifiable risk factors. The former are gender, age, ethnicity, and heredity, and the latter are hypertension, diabetes mellitus, hyperlipidemia, obesity, smoking, and carotid atherosclerotic disease. The early detection risk factors reduce the morbidity and mortality (11). In 1981, it was suggested that standard panoramic radiographs are a useful tool in detecting patients at risk of stroke, because the carotid artery calcifications may be seen in the standard panoramic radiograph adjacent to the cervical vertebrae at the level of the C3–C4 intervertebral junction. Such calcification may seem as either a radiopaque vertical line or nodular radiopaque mass inferior to the angle of mandible. Dentists should be able to diagnose common carotid artery calcifications and be able to distinguish them from a myriad of anatomical and pathological lesions which may be seen in the region. Verification of carotid artery calcifications must be conducted with cervical spine radiographs, angiography or Doppler ultrasound analysis and imaging, so panoramic radiographs are used routinely in the evaluation of patients with dental problems. It is not as useful as Doppler ultrasongraphy and three-dimensional computed tomography for detecting atherosclerotic plaque in the carotid arteries and especially the stenosis of the vessels, but it is very cheap and non-invasive method in comparison to other imaging methods. panoramic radiographs may help us in the early diagnosis and in the evaluation of common carotid artery calcifications in patients with or without associated risk factors and decrease the morbidity and mortality due to diseases caused by atherosclerosis.

The study population consisted of total 412,190 males and 222 females with age (range: 18–83 years) at the time of panoramic radiographs taken. Of the 412 individuals, 50 (12.2%) were detected to have carotid artery calcifications on panoramic radiographs. The 50 individuals who had common carotid artery calcifications consisted of 22 males (41.7%) and 28 females (58.3%). Common carotid artery calcifications were not significantly different between the males and females, carotid artery calcifications were seemed as a radiopaque mass or masses adjacent to or just upper the intervertebral space between C3 and C4. These calcifications were unilateral in 34 patients (68%) and bilateral in 16 patients (32%) subjects. Of the 50 patients there were (16 bilateral) common carotid artery calcifications. Therefore, 50 common carotid artery calcifications were detected in the 34 patients, 16 (32 %) of the common carotid artery calcifications were located on the right side and 18 (36%) were located on the left side. As in our study, in Pornprasertaks-Damrongsi and Thanakun and Carter et al’s studies, the carotid artery calcifications prevalence was not different between male and female population. Tamura et al and Bayram et al revealed that the carotid artery calcifications incidence in female patients was approximately three times higher than the incidence in males. We suggest that all these different carotid artery calcifications prevalences in female and male populations are probably due to the sample of the studies.13, cardiology inter consultation must be routine conduct when there is a suspicion of CCAC. Cardiology inter consultation for patients with images of CCAC detected on panorama. Furthermore, it is very important to consider that early diagnosis of this
disease propitiates early initiation of cardiovascular therapy and therefore the prevention of events that can endanger the patient’s life.

5. CONCLUSION

As a result, common carotid artery calcifications found as incidental findings on standard panoramic radiographs may be important markers for future coronary artery disease, strokes and death. Panoramic radiographs should be carefully examined in the area of the carotid artery in not only patients with systemic disease such as diabetes, renal disease etc, but also asymptomatic patients. The common carotid artery calcifications in the present study were detected by standard panoramic radiograph. Most of the common carotid artery calcifications were detected on the left side.

The carotid artery calcifications incidence in female patients is approximately equal to the rate in male patients in our sample. In the current study the relationship between medical history and common carotid artery calcifications. In 50 patients with common carotid artery calcifications, 14 subjects (25%) Diabetic, 8 subjects (14.3%) Hypertensive patient and 4 subjects (7.1%) reported Anemic patient, 2 subjects (3.6%) reported Cardiovascular disease patient, 2 subjects (3.6%) reported immune disease patient.

According to our knowledge, this study has the highest common carotid artery calcifications prevalence in comparison to the other studies. Also, this is the first study done in Abha-Asser region and investigating the risk factors related to carotid artery calcifications in the saudi population. In conclusion, we believe that dentists caring for subjects with dental problems should carefully evaluate their PRs for the evidence of common carotid artery calcifications, and refer them for medical evaluation as indicated. So, incidental findings could provide life-saving information.

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REFERENCES