A study of correlation of pulp stones with cardiovascular diseases

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ABSTRACT

Introduction: Pulp stones are a common occurrence among dental practice. The incidence of cardiovascular disease has increased in Indian over the years. This study aimed to know the prevalence of pulp stone among cardiac patients and to find a correlation between the number of pulp stone and cardiovascular status

Materials and Methods: A total of 200 patients were divided into two groups, 100 with a history of cardiovascular disease and 100 control. Panoramic radiographs were taken and two independent well-trained observers assessed the radiographs for the number of pulp stones. A descriptive statistic and Mann-Whitney U test was used for statistical analysis.

Results: Cardiac patients have a higher number of pulp stones compared to the control group and the result was statistically significant with both Observers 1 & 2 (0.008 and 0.002)

Conclusion: Patients with cardiovascular disease have High number pulp stone. Panoramic radiographs when will studied have good prognostic value and can be used to identify cardiovascular disease.

Keywords: Pulp Stones, Cardiovascular disease, Panoramic radiographs.

INTRODUCTION

Pulp stones are discrete calcifications and are amongst changes that include more diffuse pulp calcifications such as dystrophic calcification. Pulp stone may be classified based on their structure and location. Structurally there are true and false pulp stones. True pulp stones are made of dentine and lined by odontoblasts whereas false pulp stones are formed from degenerating cells of the pulp that mineralize. A single tooth may have stones ranging from 1 to 12 or even more, with sizes varying from minute particle to large masses that occlude the pulp space.¹

Pulp stone has been noted in patients with a systemic or genetic disease such as dentin dysplasia, dentinogenesis imperfecta and certain diseases such as Vander Woude syndrome.² There is also evidence that hypercalcemia, gout, and renal lithiasis are predisposing factors to pulpal calcification.³

Pulp stones are often incidental to dental procedures. Pulp stones could be studied based on x-ray or Histological sections. X-rays show pulp stone if they are greater than 200 μm. Histologically the detection is much higher than x-rays, however, x-rays are the only way to non-invasively evaluate paper pulp in clinical research. ⁴

Pulp stones are mostly present as with pulpal pain. The pain may vary from mild to severe. They can obstruct the root canals which leads to endodontic failure. Calcific atheroma’s and the calcification of dental pulp may have similar pathogenesis so the routine dental radiographs may be useful as a rapid screening method for early identification of potential cardiovascular diseases.⁵
Cardiovascular diseases are a group of disease which affect the heart and the circulatory system. It is important to understand that cardiac disease manifests itself in four broad categories: ischemic, valvular, arrhythmic and myopathic (congestive heart failure). The hypothesis of this study was the factors leading to atherosclerosis and calcified atheroma’s in large vessels similarly could cause atherosclerosis and calcification of small vessels, and thus pulp stones. Thus aim and objectives of the study were to find out the prevalence of pulp stones among the Indian population, to know the possible correlation between pulpal calcification and cardiovascular diseases, and to establish the use of a panoramic radiograph for early identification of cardiovascular diseases.

MATERIAL & METHODS
The study was planned to evaluate the correlation of pulp stones in cardiovascular diseases. This study was carried from 2010 to 2012. Ethical clearance was obtained for this study. Subjects were randomly selected from the outpatient department of Oral Medicine and Radiology.200 participants were included in the study.

Group A: 100 patients who had a history of cardiovascular disease.
- History of cardiovascular diseases, could be either of the following diseases: Angina pectoris, Myocardial infarction, Heart surgery, Hypertension, Congestive heart failure, Cerebrovascular accident, Hypercholesterolemia or Arrhythmia
- non-carious, minimally restored teeth
- No history of Gout or any other renal lithiasis.
- Age group: 20-55 years.

Group B: 100 patients of control group
- No history of cardiovascular disease or any other systemic condition.
- Non-carious, minimally restored teeth.
- Age group 20 to 50 year
- Randomly selected patients who needed a orthopantomogram for their treatment.

Informed written consent was obtained from patients after explaining the study details. A detailed case history was recorded, and all due radiation protection precaution (lead aprons and thyroid collars) was taken.

Orthopantomogram (Panoramic radiograph) was taken (Figure 1) Two observers with a minimum of 5 years of clinical OMFR experience were appointed to read the two sets of radiographs. A total of 200 radiographs were coded before giving them to the observers. All identification tags were removed from the set of radiographs. The observers were asked to comment on the number of teeth showing pulp stones. Reading of the radiographs was done under ideal viewing conditions.

Data collected was compiled on to an MS Office excel worksheet & subjected to statistical analysis using SPSS software. Descriptive statistics like frequency (n) & percentage (%) of categorical data, mean & Standard deviation of numerical data in each group were calculated. Shapiro-Wilk test was done to check the normality of the data, however, the data did not follow Normal Curve thus Mann-Whitney U test used for statistical analysis between the cardiac group and control group.

Figure 1: Photograph showing patient positioned for Orthopantomogram in Kodak 9000 3 DVT machine.
RESULTS
The sample included 200 subjects. The mean age of Group A (Cardiac Patients) was 40.02 years. There were 43 male & 57 females. The mean age among Group B (control group) was 35.40 years. There were 60 male & 40 females. (Table1) Among the 100 Cardiac Patients, 69 - Hypertension, 12 - Ischemic diseases, 6 - Angiography, 2 - Congestive cardiac failure, 7 - Hypercholesterolemia, 3 - Angina pectoris and 1 - Arrhythmia. The age range of the participants ranged from 20-50 years. 60.81% of cardiac patients belonged to 41-50 years, 54.43% of the cardiac patients belonged to 31-40 years and 25.53% belonged to 20-30 years. (Graph1) Irrespective of the arches, the pulp stones were more in Group A (Cardiac Patients) than Group B (Control Group). However, there was a difference in the number of pulp stones was statistically significant when both arches together were compared (p 0.008 & 0.002). Amongst the arches, a significant difference was found in the maxillary arch (p 8.13E-05 & 2.17E-05)

Table 1: Demographic Characteristics of Participants

<table>
<thead>
<tr>
<th>Sex</th>
<th>Group A (Cardiac Group)</th>
<th>Group B (Control Group)</th>
<th>Total N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>60</td>
<td>103(51.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
<td>40</td>
<td>97 (48.5%)</td>
</tr>
<tr>
<td>Column Total</td>
<td>100</td>
<td>100</td>
<td>200(100%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Group A</th>
<th>Group B</th>
<th>Total N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 to 30</td>
<td>12</td>
<td>35</td>
<td>47(23.5%)</td>
</tr>
<tr>
<td>31 to 40</td>
<td>43</td>
<td>36</td>
<td>79 (39.5)</td>
</tr>
<tr>
<td>41 to 50</td>
<td>45</td>
<td>29</td>
<td>74 (37%)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>200(100%)</td>
</tr>
</tbody>
</table>

Table 2: Comparison of Number of Pulp Stones between Group A and Group B, among Maxillary arch, Mandibular Arch and Both arch. (Observer 1 & Observer 2)

<table>
<thead>
<tr>
<th>Arch</th>
<th>Group A (Mean ± S.D)</th>
<th>Group B (Mean ± S.D)</th>
<th>Mann Whitney Test</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary</td>
<td>Observer 1 3±1</td>
<td>2±2</td>
<td>3,417.00</td>
<td>8.13E-05 *</td>
</tr>
<tr>
<td></td>
<td>Observer 2 3±2</td>
<td>2±2</td>
<td>3,291.00</td>
<td>2.17E-05 *</td>
</tr>
<tr>
<td>Mandibular</td>
<td>Observer 1 2±2</td>
<td>2±2</td>
<td>4,715.50</td>
<td>0.479</td>
</tr>
<tr>
<td></td>
<td>Observer 2 2±2</td>
<td>2±2</td>
<td>4,626.00</td>
<td>0.352</td>
</tr>
<tr>
<td>Both Arches</td>
<td>Observer 1 5±2</td>
<td>4±3</td>
<td>3,919.50</td>
<td>0.008*</td>
</tr>
<tr>
<td></td>
<td>Observer 2 6±3</td>
<td>4±3</td>
<td>3,757.50</td>
<td>0.002*</td>
</tr>
</tbody>
</table>

Graph 1: Showing distribution of age in Group A (Cardiac) & Group B (Control)
DISCUSSION
Pulp stones can be identified by histologic and radiographic ways, the prevalence of pulp stone by radiographic ways is 20-25%, and while histologic the prevalence is higher. This could be attributed to the fact that pulp stones only larger than 200µ are seen on radiographs.

The literature revealed that various radiographic techniques were used, al-Hadi Hamasha and Darwazeh in their study used periapical and bitewing radiographs, Çolak et al. used bitewing radiographs, whereas Satheeshkumar et al. and Syryn’ska et al. used panoramic radiographs for pulp stones detection.

Panoramic radiograph was used in our study as it offers several advantages over bitewing and intraoral peri apical radiography. The broad anatomic region imaged, relatively low patient radiation dose, greater ease, and it is one of the most frequently done radiographs nowadays used in detecting maxillofacial pathology. Panoramic radiograph covers maxillary and mandibular teeth in a single exposure and easy to perform on the patient as compared to intraoral radiographs.

Both Observer 1&2 showed that pulp stones are more frequently present in cardiovascular disease group subjects as compared to control group subjects.

Edds AC et al demonstrated that patients with cardiovascular diseases have an increased incidence of pulp stones in teeth with non-inflamed pulps compared to patients with no history of cardiovascular diseases. Ezoddini AF et al concluded that pulp stones are frequent findings in patients who had undergone angiography.

Moura AAM and Paiva JG state that incidence of pulp stones & pulpal calcifications was higher in patients with coronary atherosclerosis than in patients who did not suffer from this disease. Nayak et al. found a positive correlation between systemic disorder and pulp stones. Cardiovascular diseases patients have a maximum number of pulp stones. Sayegh & Reed conclude that systemic variations such as atherosclerosis, gout and renal lithiasis can be considered as factors predisposing to pulpal calcification with cardiovascular diseases.

When arches were compared our study reflected a significant difference in the maxillary arch than the mandibular arch, and this find was in line with study by Nayak et.al, Talla HV et al and the results were contradictory to Moss-Salentijn L and Baghdadyd VS et al.

CONCLUSION
Dental panoramic radiographs could help in screening for pulp stones, it also has prognostic value and may be used for early detection of cardiovascular disease in patients. Panoramic radiographs when well-studied could help dentists identify patients with early cardiovascular diseases.

REFERENCES

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