Original article

Radiographic Assessment of the Prevalence of Pulp Stones in Iranian Population

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Abstract:

Introduction: Pulp stones are separate calcified mass that we can observe in the dental pulp. The present study is conducted to evaluate the Incidence and Distribution of Pulp Stones Found in Radiographic Examination of Dental Patients in Sari.

Methods: In total, 493 panoramic radiographs from patients attending the dental clinics of at Mazandaran University of Medical Science, from January 2017 to April 2018 were examined. The sample composed of 164 male and 329 female with age range of 10-60 years. About 3235 teeth were evaluated. Associations of pulp stones with different tooth types, sex, upper or lower arc and the side were noted.

Findings: The overall prevalence of pulp stones in the present population was found 15.21%. Females constituted 73.33% and males constituted 26.67%. No significant gender difference with the occurrence of pulp stones was observed. 37.14% was the incidence of pulp stones in left maxillary first molar which was considered to be the highest frequency compared to all other teeth.

Conclusion: In conclusion, maxillary first molars had maximum number of pulp stones and patients in the age group from 20-30 years had more pulp stones than the others. All this information could be of help during endodontic procedures

Keywords: Panoramic radiographs, Prevalence, Pulp stones, Iranian population

Introduction:

Pulp stones are calcified mass in the pulp of tooth. Calcification can occur in the dental pulp as separate calcified stones or as diffuse form that can occur either in the pulp tissue or attached to dentin. (1) They are usually detected during radiographic examination as radiopaque areas of variable sizes and shapes. (2) Structurally, pulp stones are classified as true that are made of normal tubular dentine and lined by odontoblasts and as false, wherein pulp stones are formed from degenerating pulp cells that become mineralized. A third type, amorphous'pulp stones, has more irregular shape compared to the false type. (2,3).The etiology of pulp calcification is unknown. However, some factors like genetic predisposition have played a role in forming stone (4),

Orthodontic tooth movement, dentine dysplasia, dentinogenesis imperfect and in certain syndromes such as Vandrwoude syndrome (5), nanobacteria (6), circulatory disturbance in pulp, age (7), fluoride supplementation (8), interactions between the epithelium and pulp tissue, idiopathic factors (9), Marfan syndrome (10) and long-standing irritants like caries, deep restorations, and chronic inflammation. (11) Pulp stones are diagnosed by X-ray imaging and histological slides. Radiographic appearance of pulp stones is radiopaque masses, which is differ in size from several millimeters to filling the whole chamber or root canal. (1, 3, 12)

One of the common symptoms of pulp stones is pain, which can vary from mild to severe. (6, 11)

It has been reported that the incidence of pulp stones increase with age. (13, 14) Some studies did not discover any difference in occurrence between males and females (1, 11, 14, 15), whereas other studies have found females to have more pulp stones than males. (16, 17)

Since the prevalence of pulp stones varied in different populations, this study was carried out to assess the frequency of pulp stone and to evaluate possible associations between pulp stones and gender, tooth type, and side in Sari population, Mazandaran, Iran.

Methods:

In this retrospective cross-sectional study, 493 dental records were selected from the records of patients who attended the dental clinics at Mazandaran University of Medical Sciences, Mazandaran, Iran, for routine dental treatment. These records were registered between January 2017 to April 2018. The digital panoramic radiographs were examined by an expert endodontist and a dental student simultaneously after put the radiograph on a viewer; Only high quality Images which had not any superimposition were checked. About 3235 teeth were evaluated; teeth with crowns or bridges that prevented adequate vision of the pulp chamber were not included in the study sample.

The sample composed of 164 male and 329 female with the age range of 10-60 years. Information about name, age and gender had been recorded for each patient.

Intra-pulpal dense radio-opaque structures seen in the panoramic radiographs were considered as pulp stones and were scored as present or absent, number of stone and associations with, gender, dental arch and tooth type were recorded. Score of present was given only after the confirmation of two examiners.

Findings:

A total of 493 patients, 329 females (66.73%) and 164 males (33.27%) with 3235 teeth was evaluated in the present study, and according to Chi-square test there were no significant difference between the number of males and females (Chi-square=55.223, df=1, P-value<0.001).

The age range of the subjects was 10-60 years, pulp stones were observed in 75 patients (15.21%) and 5.37% teeth; 55 females and 20 males, as shown in table 1.

According to gender the incidence of pulp stone in females was slightly higher than in males. However, the difference was no significant (P-value= 0.188).

We used Fisher's exact test to compare and evaluate the relationship between two variables of age and prevalence of pulp stone (P-value=0.030). The age group from 20-30 years showed higher frequency of pulp stone as compared to other groups

(30.67%). However, the number of patients with pulp stone is significantly lower than the number of patients without pulp stone in the age group from 20-30 years.

As we see in table 3 the highest frequency of pulp stone was found in maxillary left first molars (37.14%) followed by maxillary right first and second molars and mandibular right first molars showed the lowest occurrence (4.29%).

4 patients showed pulp stones in every 4 quadrants (5.33%) and 2 patients had pulp stones in all quadrants except left mandible (2.66%), also 4 patients had pulp stones in all quadrants except right mandible (5.33%).

Discussion:

In the present study panoramic radiography was the criteria for the identification of pulp stone, although the best method is microscopy which reports more frequency because of its high accuracy. Any way radiography is considered as the most common and non-invasive method. Pulp stones with a diameter less than 200 µm are not seen on radiographs. (18, 19)

The frequency of pulp stone was 15.21% in the present study which was less than the reported prevalence in studies performed by Ranjitkar et al. (1), Baghdady et al. (20) and other studies. (14,16, 21)

The studies performed by Colak et al. (22) and Turkal et al. (23) reported higher prevalence in females than males (P-value= 0.188). However, Baghdady et al. (20) reported more common pulp stones in males than females. Although there were many studies which reported no significant difference between two genders about incidence of pulp stone. (1, 14, 24-27)

In the present study a significant relationship was found between age and prevalence of pulp stone and the highest occurrence was reported in the 20-30 years age group (P-value=0.030). However, in some studies no significant relationship was found. (23) Also there are some studies in which the prevalence of pulp stones is higher at older ages like the 5th decade. (28)

In the present study the highest frequency of pulp stone was found in maxillary left first molars (37.14%) followed by maxillary right first and second molars and mandibular right first molars showed the lowest occurrence (4.29%), these results were similar to the results of other studies (19, 22, 23), although there are some studies in which mandibular molars showed the highest prevalence of pulp stones. (14, 20, 29) The first permanent teeth which erupt in the oral cavity are first molars and they tolerate most of occlusal forces because of their larger surface area perhaps leading to early degenerative changes. In addition first molars have the biggest pulp chamber and rich blood supply (16, 30) and these factors lead to increased calcifications. It should be noted that pulp pathologies are not the only reasons for forming pulp stones, because occurrence of pulp stones is reported even in young subjects. (18)

Pulp stones do not have clinical symptoms and can be formed within the pulp of the tooth, either within the crown or within the root canals and they can disrupt the treatment process (31), However, this problem can be easily managed by providing proper access cavity and the use of appropriate tools during treatment.

Conclusion:

It is concluded that the incidence and distribution of pulp stones was more in maxillary teeth and in patients in the age group from 20-30 years. The incidence was more among the maxillary left first molars.

The data concluded from the present study could serve as a useful aid for endodontists in root canal treatment procedures.

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Tables:

Table 1: Prevalence of pulp stones and distribution between sexes

		Gender								
		Male			Female			Total		
Pulp stone		F	P (%) in column	P (%) in row	F	P (%) in column	P (%) in row	F	P (%) in column	P (%) in row
	Yes	20	12.20%	26.67%	55	16.72%	73.33%	75	15.21%	100%
	No	144	87.80%	34.45%	274	83.28%	65.55%	418	84.79%	100%

F, frequency; P, Percentage.

Table2: Prevalence of pulp stones in relation to age group

		Pulp Stone			
		Yes		No	
		frequency	percentage	frequency	percentage
age classification	10-20	14	18.67%	57	13.64%
	20-30	23	30.67%	193	46.17%
	30-40	22	29.33%	120	28.71%
	40-50	13	17.33%	42	10.05%
	50-60	3	4.00%	6	1.44%
	total	75	100.00%	418	100.00%

Table 3: Prevalence of pulp stones by dental arch

		frequency	**percentage in column**	**total percentage**
right maxiilary tooth number	6,7	16	33.33%	22.86%
	6	16	33.33%	22.86%
	7	16	33.33%	22.86%
left maxillary tooth number	6,7	12	24.00%	17.14%
	6	26	52.00%	37.14%
	7	12	24.00%	17.14%
right mandibular tooth number	6,7	3	25.00%	4.29%
	6	3	25.00%	4.29%
	7	6	50.00%	8.57%
left mandibular tooth number	6,7	4	26.67%	5.71%
	6	4	26.67%	5.71%
	7	7	46.67%	10.00%