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Radiographic Assessment of Pre-Eruptive Intracoronal Resorption in the Pediatric Population of Southeastern Anatolia Region of Turkey: A Retrospective Cross-Sectional Study

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Research Article

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ABSTRACT

Objective: This study aims to evaluate the prevalence and distribution of pre-eruptive intracoronal resorption (PEIR) in panoramic radiographs of children and adolescents aged 6-16 years who sought clinical care for various reasons in the Southeastern Anatolia Region of Turkey. The study also seeks to contribute to the early diagnosis and treatment processes of PEIR.

Materials and Methods: Panoramic radiographs of 2,597 individuals who visited the Department of Pediatric Dentistry at Dicle University Faculty of Dentistry between January 2021 and December 2023 were retrospectively analyzed. Data were evaluated based on age, gender, tooth type, and dental arch. The prevalence of PEIR and the distribution of affected teeth across different dentition stages were examined in detail. Statistical analysis was performed using IBM SPSS V23 software, with a significance level set at $p<0.05$.

Results: The individual prevalence of PEIR was found to be 2.9%, while the tooth-based prevalence was 0.13%. PEIR was most commonly observed during the mixed dentition period and in the mandibular permanent teeth. A statistically significant relationship was found between the presence of PEIR and the mixed dentition stage ($p=0.003$), as well as the permanent dentition stage ($p=0.007$). No statistically significant difference was detected between genders ($p=0.104$), although PEIR was more prevalent in the mandible than in the maxilla. The most frequently affected teeth were the mandibular permanent left second premolar, the right second premolar, and the maxillary permanent left second molar.

Conclusion: Early diagnosis plays a critical role in preventing the progression of lesions and improving dental prognosis through appropriate restorative interventions. In our research conducted with panoramic radiographs in the Southeastern Anatolia Region, the prevalence of PEIR was identified as 2.9%. Our study emphasizes the importance of early diagnosis of PEIR and recommends that future studies incorporate advanced imaging techniques, including those from other regions.

Keywords: Pre-eruptive intracoronal resorption, panoramic radiography, dentition period, unerupted teeth, radiolucent appearance

Türkiye'nin Güneydoğu Anadolu Bölgesindeki Pediatrik Populasyonda Pre-Eruptif İntrakoronal Rezorpsiyonun Radyografik Olarak Değerlendirilmesi: Retrospektif Kesitsel Bir Çalışma

Araştırma Makalesi

Süreç

Geliş: 31/10/2024
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ÖZ

Amaç: Bu çalışma, Türkiye'nin Güneydoğu Anadolu Bölgesi'nde çeşitli sebeplerle kliniğe başvuran 6-16 yaş arası çocuk ve adölesanların panoramik radyografilerinde pre-eruptif intrakoronal rezorpsiyonun (PEİR) prevalansını ve dağılımını değerlendirmeyi amaçlamaktadır. Çalışma, PEİR'in erken tanı ve tedavi süreçlerine katkı sunmayı hedeflemektedir.

Gereç ve Yöntemler: Ocak 2021- Aralık 2023 tarihleri arasında Dicle Üniversitesi Diş Hekimliği Fakültesi Pedodonti Anabilim Dalına başvuran 2597 bireyin panoramik radyografileri retrospektif olarak incelendi. Veriler yaş, cinsiyet, diş tipi ve çene arkına göre analiz edildi. PEİR prevalansı, dişlerin ve çenelerin farklı dişlenme evrelerindeki dağılımı detaylı bir şekilde değerlendirildi. IBM SPSS V23 programı kullanılarak analiz edilen veriler için, $p<0,05$ anlamlılık düzeyi olarak kabul edildi.

Bulgular: PEİR'in bireysel prevalansı %2,9; diş bazlı prevalansı %0,13 olarak tespit edildi. PEİR, en sık karma dişlenme döneminde ve mandibular daimi dişlerde görüldü. PEİR varlığının karma dişlenme dönemi ($p=0.003$) ve daimi dişlenme dönemi ($p=0.007$) ile istatistiksel olarak anlamlı ilişkisi saptandı.Cinsiyetler arasında anlamlı bir fark bulunmazken ($p=0,104$), mandibulada maksillaya göre daha yaygın olduğu saptandı. PEİR'in mandibular daimi sol ikinci premolar, sağ ikinci premolar ve maksiller daimi sol ikinci molar dişlerde daha sık görüldüğü belirlendi.

Sonuç: Erken teşhis, lezyonların ilerlemesini önlemek ve uygun restoratif müdahalelerle dental prognozu iyileştirmek açısından kritik bir rol oynamaktadır. Güneydoğu Anadolu Bölgesi'nde panoramik radyografilerle gerçekleştirdiğimiz araştırmada, PEİR prevalansı %2,9 tespit edildi. PEİR'in erken tanısının önemi hakkında farkındalık yaratmayı hedeflediğimiz çalışmamız sonucunda gelecek araştırmalarda farklı bölgelerin de dahil edildiği ileri görüntüleme tekniklerinin kullanılmasını önermekteyiz.

Anahtar Kelimeler: Pre-eruptif intrakoronal rezorpsiyon, panoramik radyografi, dentisyon dönemi, sürmemiş dişler, radyolusens görünüm

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Introduction

Pre-eruptive intracoronal resorption (PEIR) is a term used to describe an anomaly characterized by an abnormal, well-defined, radiolucent area within the coronal dentin tissue near the enamel-dentin junction of unerupted teeth.[1] Although PEIR was first identified in 1941, its etiology remains unclear, and only a limited number of studies have been conducted in this field. Moreover, no significant relationship has been established between PEIR and factors such as gender, race, medical conditions, systemic factors, or systemic fluoride supplementation.[2,3]

From a histological perspective, some case reports suggest a connection between PEIR and multinucleated giant cells, osteoclasts, and chronic inflammatory cells.[4] A study conducted in Turkey by Özden and Açıkgöz reported an individual prevalence of 1.55% and a tooth-based prevalence of 0.95% for PEIR.[5]

The clinical significance of PEIR lies in the assumption that it constitutes a substantial portion of hidden caries in seemingly healthy permanent teeth of children and adolescents. Therefore, it is recommended to carefully screen and assess PEIR defects during radiographic examinations of unerupted or erupting teeth. Typically, only one tooth is affected in an individual; however, nearly half of these defects are observed to extend beyond two-thirds of the dentin thickness.[6] These defects are usually located in the mesial or central regions of the crown, close to the dentin-enamel junction. PEIR is reported to affect molars and premolars more frequently. Although it can progress to various depths, PEIR lesions rarely involve the pulp.[4] In some cases, the pulp may be affected within a short time, potentially leading to the formation of a dental abscess.[7] Clinically, PEIR is significant as cases with rapid progression may require endodontic treatment.[8]

Currently, there is no established protocol for the treatment of PEIR. Suggested treatment options include defect restoration, root canal therapy, and extraction. In cases where the defect remains stable, most researchers recommend a conservative approach, monitoring the defect until the tooth fully erupts.[9,10] After eruption, restoration is often necessary. If the defect increases in size over time, immediate treatment is essential to prevent complications.[11]

As a low-radiation diagnostic method, panoramic radiography plays a crucial role in the early detection of PEIR defects in unerupted teeth, enhancing treatment outcomes by preventing the progression of these resorptive lesions. Factors such as the quality of radiographic images, the imaging technique used, professional experience, expertise, and awareness of PEIR can influence diagnosis.[12,13]

This retrospective cross-sectional study aims to evaluate the prevalence and demographic distribution of PEIR in panoramic radiographs of children and adolescents aged 6-16 years who visited our clinic in the Southeastern Anatolia Region of Turkey for various reasons. The study also seeks to contribute to the development of early diagnostic and treatment approaches for PEIR.

Materials and Methods

This study was conducted in accordance with the Declaration of Helsinki and received ethical approval from the Local Ethics Committee of the Faculty of Dentistry at Dicle University with the protocol number 2023-52, dated December 27, 2023.

Sample Size Calculation

Between January 2021 and December 2023, a total of 72,510 individuals visited the Department of Pediatric Dentistry at Dicle University Faculty of Dentistry for dental treatment. Based on this data, the sample size was calculated using the OpenEpi sample size calculator (https://www.openepi.com/SampleSize/SSPropor.htm). The calculation was performed with a 95% confidence level and a 5% margin of error. Accordingly, the minimum required sample size was determined to be 383.

Study Group

The sample for this study was obtained from archived panoramic radiographic films of individuals who visited the Department of Pediatric Dentistry at Dicle University Faculty of Dentistry between January 2021 and December 2023 for dental treatment. The consent form routinely obtained from individuals for dental treatment purposes in our clinic before treatment includes permission to scientifically store radiographic images (e.g. panoramic radiography, cone beam computed tomography, wrist radiographs, lateral cephalometric radiographs).

Radiographic Evaluation

All digital panoramic radiographs (Progeny, Midmark Company, USA) were obtained using a panoramic X-ray device with the following parameters: 0.5 mm focal spot size, 3.2 mm filtration, 70 kVp, 10 mA, and 15.9 seconds scan time. The scans were conducted using the standard panoramic mode of the device. All data were evaluated by two dentists (YP and ECT) together under optimum ambient lighting conditions on an HP Envy 13-ah1xxx laptop with a 13.3-inch screen, 1920x1080 pixel resolution, and an Intel Core i7 processor. Data were reviewed simultaneously by two dentists on the same computer without calculating the interobserver correlation coefficient, and the final classification and radiographic confirmation of the findings were determined by consensus between the observers. The radiographic evaluations were limited to individuals aged 6-16 years, and the collected data were analyzed by grouping according to age, gender, tooth type, and dental arch. The prevalence of PEIR defects in permanent teeth, their distribution across the jaws, and their prevalence at different dentition stages were thoroughly assessed.

Inclusion Criteria

Patients with normal skeletal and dental developmental characteristics, no medical problems in the archive records, and no congenital or acquired malformations, cysts, or lesions in the maxillofacial region were included in the study. The radiographs had to be free of artifacts or distortions and clear enough to allow for detailed evaluation. Data from individuals within the specified age range and dates were included. Additionally, patients in the primary, mixed, and permanent dentition stages were selected, and the evaluated permanent teeth were required to be unerupted and radiologically retained within the bone. Based on these criteria, 2,597 panoramic radiographic images were included in the study. Any data not meeting these criteria were excluded. A flow diagram summarizing the inclusion and exclusion criteria of the study is presented in Figure 1.

Figure 1. Flow diagram of the inclusion and exclusion criteria used in the study

Statistical Analysis

Data analysis was performed using IBM SPSS V23 software. The Kolmogorov-Smirnov test was used to assess the normality of the data distribution. For parameters following a normal distribution, the Mann-Whitney U test was applied for pairwise group comparisons. The Pearson Chi-Square Test and Fisher's Exact Test were used to evaluate relationships between categorical groups. The results were presented as mean ± standard deviation, median (minimum–maximum), and frequency (%). A significance level of $p<0.05$ was considered statistically significant.

Results

Descriptive statistics showed that 51.9% of the participants were female, while 48.1% were male, with an average age of 11.05 years. The proportion of individuals without PEIR was 97.1%, while PEIR was observed in 2.9% of the sample. The distribution of individuals with PEIR revealed that 97.1% had no PEIR, 2.7% had only one lesion, and 0.2% had two lesions (Table 1). An image from the panoramic radiograph demonstrates two PEIR lesions in the same individual, both located in the coronal regions of permanent teeth (Figure 2).

There was no statistically significant relationship between the presence of PEIR and gender (p=0.104). PEIR was absent in 97.6% of males and present in 2.4%, while 96.6% of females did not show signs of PEIR, with 3.4% exhibiting the condition (Table 2).

There was no statistically significant relationship between the presence of PEIR and the primary dentition period (p=1.000). Among individuals not in the primary dentition period, 97.1% showed no PEIR, while 2.9% exhibited PEIR. For those in the primary dentition period, 97.7% were PEIR-free, and 2.3% had PEIR. A statistically significant relationship was found between PEIR presence and the mixed dentition period (p=0.003). In individuals not in the mixed dentition period, 98% had no PEIR, while 2% exhibited PEIR. However, among those in the mixed dentition period, 96.1% were PEIR-free, while 3.9% showed PEIR. Additionally, a statistically significant relationship was observed between the presence of PEIR and the permanent dentition period (p=0.007). Among individuals not in the permanent dentition period, 96.3% had no PEIR, while 3.7% exhibited it. Conversely, 98.1% of those in the permanent dentition period had no PEIR, while 1.9% had it (Table 3).

There was no statistically significant difference in median age values between individuals with and without PEIR (p=0.134). The median age for those without PEIR

was 11 years, while for those with PEIR, it was 10 years (Table 4).

PEIR was not observed in maxillary permanent right canines. The prevalence of PEIR in maxillary permanent right arch was; 0.08% in first premolars, 0.04% in second premolars, 0.12% in first molars, 0.08% in second molars, and 0.04% in third molars. In the maxillary permanent left arch, PEIR was found in; 0.04% of canines, 0.04% of first premolars, none in second premolars, 0.08% in first molars, 0.31% in second molars, and 0.08% in third molars. In the mandibular permanent right arch; no PEIR was observed in canines, while the prevalence was 0.04% in first premolars, 0.42% in second premolars, 0.15% in first molars, 0.19% in second molars, and 0.23% in third molars. In the mandibular permanent left arch; no PEIR was found in canines, with prevalence rates of 0.23% in first premolars, 0.46% in second premolars, 0.0% in first molars, 0.23% in second molars, and 0.27% in third molars. The overall prevalence of PEIR across all examined permanent teeth was 0.13% (Table 5). A panoramic radiograph shows a single PEIR lesion located near the enamel-dentin junction in the permanent left mandibular second premolar (Figure 3).

In the study, the distribution of a total of 81 teeth with PEIR according to the jaw and sides was examined. PEIR was detected in a total of 23 teeth (28.4%) in the maxilla. It was determined that 9 of these teeth were on the right side (11.1%) and 14 of them were on the left side (17.3%). PEIR was detected in a total of 58 teeth (71.6%) in the mandible. It was recorded that 27 of these teeth were on the right side (33.3%) and 31 of them were on the left side (38.3%). In general, it was determined that 44.4% of the teeth with PEIR were on the right side and 55.6% were on the left side (Table 6).

Table 1: Descriptive Statistics of Individuals

	Frequency (n) / Mean ± SD	Percentage (%)/ Median (min - max)
Gender		
Male	1348	51.9
Female	1249	48.1
Age	11.05 ± 2.99	11 (6 - 16)
PEIR Presence		
Absent	2522	97.1
Present	75	2.9
Number of PEIR Lesions		
0	2522	97.1
1	69	2.7
2	6	0.2

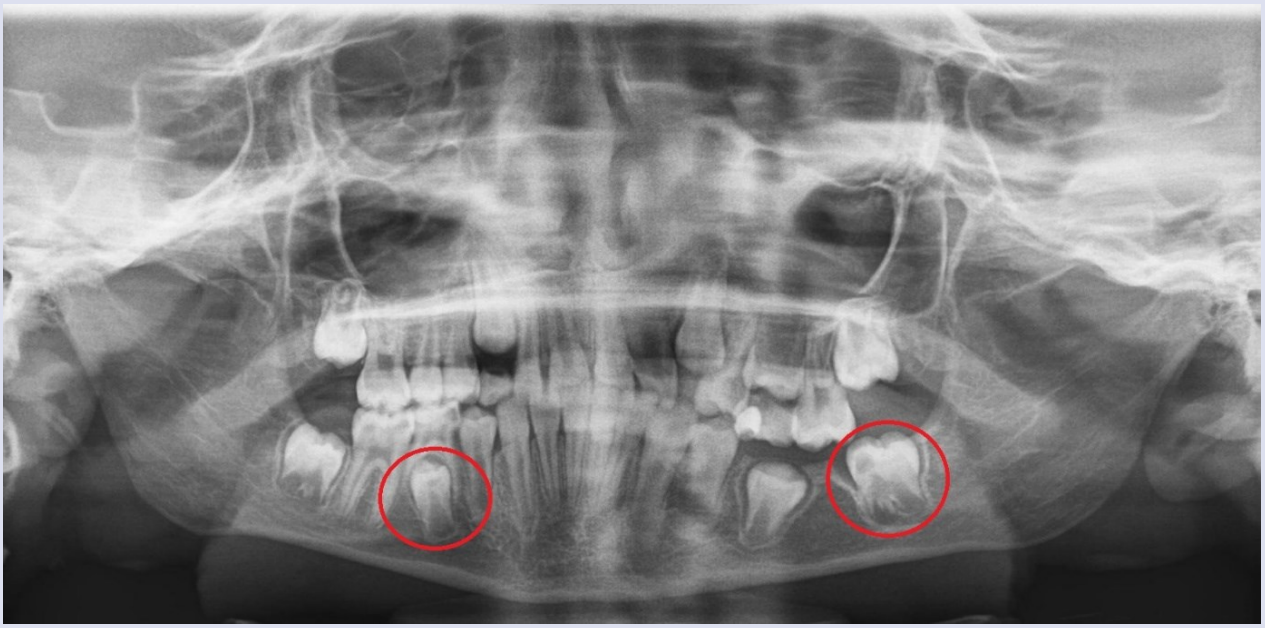

Figure 2. Panoramic Radiograph of an 11-Year-Old Female Showing Coronally Located PEIR Lesions in the Permanent Mandibular Left Second Molar and Permanent Mandibular Right Second Premolar

Table 2. Analysis of the Relationship Between PEIR Presence and Gender

	PEIR Presence		Total	Test Statistic	p*
	Absent	**Present**			
Gender					
Male	1316 (97.6)	32 (2.4)	1348 (51.9)	2.641	0.104
Female	1206 (96.6)	43 (3.4)	1249 (48.1)		

*Pearson's Chi-Square Test; Frequency (%).

Table 3. Analysis of the Relationship Between PEIR Presence and Dentition Period

	PEIR Presence		Total	Test Statistic	p
	Absent	**Present**			
Primary Dentition					
Absent	2393 (97.1)	72 (2.9)	2465 (94.9)	---	1.000**
Present	129 (97.7)	3 (2.3)	132 (5.1)		
Mixed Dentition					
Absent	1307 (98)	26 (2)	1333 (51.3)	8.582	**0.003***
Present	1215 (96.1)	49 (3.9)	1264 (48.7)		
Permanent Dentition					
Absent	1353 (96.3)	52 (3.7)	1405 (54.1)	7.216	**0.007***
Present	1169 (98.1)	23 (1.9)	1192 (45.9)		

*Pearson's Chi-Square Test; **Fisher's Exact Test; Frequency (%).

Table 4. Analysis of Age Values Based on the Presence of PEIR

	Mean ± SD	Median (min-max)	Test Statistic	p*
PEIR Presence				
Absent	11.07 ± 3	11 (6 - 16)	85030.5	0.134
Present	10.53 ± 2.61	10 (6 - 16)		

*Mann-Whitney U Test.

Table 5. Presence and Percentage of PEIR in Examined Teeth

	Total (n)	PEIR Presence (n)	Percentage (%)
Maxillary Right Canine	2597	0	0.00
Maxillary Right 1st Premolar	2597	2	0.08
Maxillary Right 2nd Premolar	2597	1	0.04
Maxillary Right 1st Molar	2597	3	0.12
Maxillary Right 2nd Molar	2597	2	0.08
Maxillary Right 3rd Molar	2597	1	0.04
Maxillary Left Canine	2597	1	0.04
Maxillary Left 1st Premolar	2597	1	0.04
Maxillary Left 2nd Premolar	2597	0	0.00
Maxillary Left 1st Molar	2597	2	0.08
Maxillary Left 2nd Molar	2597	8	0.31
Maxillary Left 3rd Molar	2597	2	0.08
Mandibular Left Canine	2597	0	0.00
Mandibular Left 1st Premolar	2597	6	0.23
Mandibular Left 2nd Premolar	2597	12	0.46
Mandibular Left 1st Molar	2597	0	0.00
Mandibular Left 2nd Molar	2597	6	0.23
Mandibular Left 3rd Molar	2597	7	0.27
Mandibular Right Canine	2597	0	0.00
Mandibular Right 1st Premolar	2597	1	0.04
Mandibular Right 2nd Premolar	2597	11	0.42
Mandibular Right 1st Molar	2597	4	0.15
Mandibular Right 2nd Molar	2597	5	0.19
Mandibular Right 3rd Molar	2597	6	0.23
Total	62328	81	0.130

All the mentioned teeth are permanent teeth

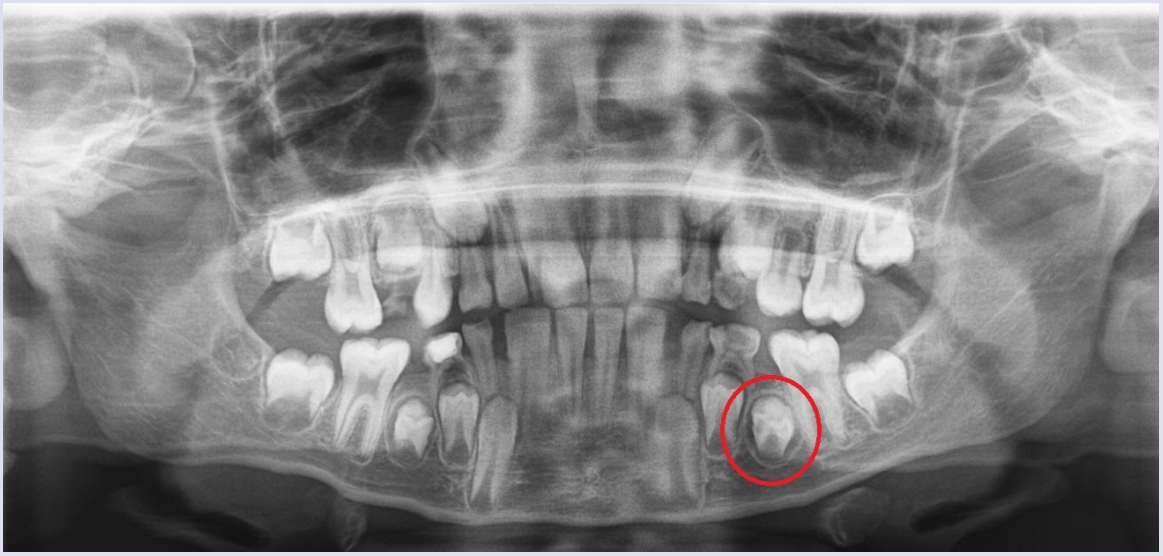

Figure 3. Panoramic Radiograph of a 12-Year-Old Male Showing a Single PEIR Lesion Positioned Near the Enamel-Dentin Junction in the Permanent Mandibular Left Second Premolar.

Table 6. Distribution of Teeth with PEIR by Dental Arches

	Right Side	Left Side	Total
Maxilla	9 (11.1%)	14 (17.3%)	23 (28.4%)
Mandible	27 (33.3%)	31 (38.3%)	58 (71.6%)
Total	36 (44.4%)	45 (55.6%)	81(100%)

Percentage (%); Teeth with PEIR /Total

Discussion

PEIR was first described in 1941 and was initially referred to in the literature with terms such as "intra-follicular caries" or "caries-like radiolucent lesions."[14] PEIR is often detected incidentally on dental radiographs and is typically located within the dentin of unerupted teeth or near the enamel-dentin junction.[10] Although various hypotheses regarding the etiology of PEIR have been proposed, it is known that local factors play a significant role. Moreover, early detection is crucial, as carious progression can develop rapidly in the lesion after the tooth erupts.[9]

Wang et al. reported a PEIR prevalence of 0.85% (6/707) among individuals aged 3.6 to 12.5 years and a tooth prevalence of 0.7% (6/8,171) based on panoramic radiographs.[15] Al-Batayneh et al. in a prospective study of individuals aged 6 to 15 years, found a case prevalence of 8.1% (128/1,571) and a tooth prevalence of 0.62% (128/20,788).[16] In a retrospective study conducted by Al-Tuwirqi and Seow using panoramic radiographs in Australia and Saudi Arabia, the case prevalence among individuals under 14 years old ranged between 0.2% (14/842) and 0.3% (3/465), while the tooth prevalence was 0.4% (21/5,140) and 0.2% (5/3,217), respectively.[17] Manmontri et al. in their retrospective study involving individuals under 20 years of age, reported a case prevalence of 1.63% (26/1,599) and a tooth prevalence of 0.32% (29/9,060) using panoramic radiographs.[18] In a more recent study, conducted with individuals aged 7 to 22 years, PEIR lesions were identified in 49 individuals, with a prevalence of 1.56%. The occurrence of PEIR lesions among all unerupted permanent teeth examined was reported as 0.25% (55/22,144).[1]

The use of bitewing radiography and cone-beam computed tomography (CBCT) in dental imaging generally results in higher PEIR detection rates (2% and 3.5%, respectively). This can be attributed to the absence of superimposition and distortion in these imaging methods.[12,19] However, Oenning et al. have proposed a new approach called the ALADAIP principle (As Low As Diagnostically Acceptable, Indication-Oriented, and Patient-Specific), which advocates for imaging practices aligned with clinical needs and tailored radiation doses for each patient. This approach aims to minimize radiation exposure by adjusting doses according to the individual requirements of each patient.[20]

In our study, panoramic radiographic archive images were preferred because they provide low radiation doses, enhancing safety in pediatric patients, while also serving as a fast and cost-effective screening tool with sufficient diagnostic information. Cone-beam computed tomography (CBCT) images were not utilized due to the higher radiation doses required and the fact that CBCT is not necessary in every clinical situation.

We retrospectively examined panoramic radiographs of 2,597 children and adolescents aged 6-16 years who visited our clinic in the Southeastern Anatolia Region of Turkey for various reasons. PEIR lesions were detected in 75 individuals, resulting in a prevalence rate of 2.9%. The

frequency of PEIR lesions among all permanent teeth examined was found to be 0.13% (81/62,328), and 97.1% of the individuals showed no signs of PEIR. Our findings are consistent with the literature, and we believe that variability in prevalence could be attributed to geographical and genetic factors, as well as differences in imaging and diagnostic methods used.

In our study, the absence of a significant difference in PEIR prevalence between genders aligns with the findings of previous studies conducted by Seow et al., Nik and Abdul Rahman, Özden and Açıkgöz, Al-Batayneh et al., and Gurdán *et al.*[1,5,16,21,22]

In the literature, one case of PEIR in primary dentition was reported by Seow and Hackley, involving the development of an abscess in a newly erupted primary second molar of a 2-year-old child.[23] Another rare case was documented by Schwimmer et al., where PEIR was identified in the lower left first primary molar of a 19-month-old child.[24]

In the study by Al-Batayneh et al., PEIR lesions were most commonly observed during the mixed dentition period, with a prevalence of 89.06%. During the primary dentition period, this rate was 10.16%, while it decreased to 0.78% during the permanent dentition period. The difference between the groups was reported to be statistically significant (p = 0.000). The authors attributed the higher prevalence of PEIR in the mixed dentition period to the greater number of unerupted teeth during this stage and the prolonged time from the formation to the eruption of permanent teeth.[16]

Similarly, in the study by Gurdán *et al.,* the highest prevalence of pre-eruptive intracoronal resorption was found in the mixed dentition group, particularly among individuals aged 7-10 years (p < 0.001). This finding suggests that PEIR lesions are especially prevalent in patients undergoing orthodontic treatment and tend to emerge predominantly during the mixed dentition period.[1]

In our study, no statistically significant relationship was found between the presence of PEIR and the primary dentition period (p = 1.000). However, statistically significant associations were identified between the presence of PEIR and both the mixed dentition period (p = 0.003) and the permanent dentition period (p = 0.007).

In the study by Zilberman *et al.,* PEIR was reported to predominantly affect the mandibular permanent first premolar, as well as the second and third molars.[25] Özden and Açıkgöz found that PEIR lesions were most frequently observed in the mandibular permanent second molars, followed by the maxillary permanent second premolars, maxillary central incisors, and maxillary canines.[5] Another study reported that PEIR lesions were most commonly found in the mandibular permanent first premolars, maxillary second molars, and mandibular second premolars, with no cases observed in the third molars or maxillary first premolars.[16] The distribution and frequency of PEIR lesions vary across studies. Wang et al. identified PEIR lesions in six cases, with the mandibular permanent second molar being the most frequently affected tooth.[15] In the study by Al-Batayneh et al., PEIR was observed in 128 cases, with only one tooth affected in each individual. The mandibular first premolar was reported as the most commonly affected tooth in their study.[16] Al-Tuwirqi and Seow's study documented 17 cases, with the mandibular permanent second molar being the most frequently affected tooth.[17] In Manmontri et al.'s study, PEIR was observed in 26 individuals, with only one tooth affected in 23 cases and two teeth affected in 3 cases. The mandibular permanent second molar was again identified as the most frequently affected tooth.[18] Although PEIR lesions are typically limited to a single tooth per individual,[12] some studies have reported multiple affected teeth in the same individual.[5,26]

In our study, 69 out of 75 patients with PEIR had only one affected tooth, while multiple teeth were affected in six patients. The most frequently affected tooth was the mandibular permanent left second premolar, followed by the mandibular permanent right second premolar and the maxillary permanent left second molar. We believe that the differences between studies may be related to variations in the examined populations, genetic and environmental factors, and the imaging methods used.

One study reported that most PEIR-affected teeth were located in the mandible, with a predominance on the right side.[16] While some studies have found PEIR to be more common in the mandible[1,6,18,27], others have reported higher prevalence in the maxilla.[5,13]

In our study, 28% of the PEIR-affected teeth were located in the maxilla, while 72% were in the mandible, consistent with findings from the literature.[1,6,18,27]Differences between studies may be attributed to variations in the characteristics of the included populations, genetic and environmental factors, and the imaging techniques employed. These differences may also be influenced by the imaging techniques employed and their alignment with the ALARA principle (As Low As Reasonably Achievable), which prioritizes minimizing radiation exposure while ensuring sufficient diagnostic information. The reliance on panoramic radiographs, frequently used in pediatric clinics due to their low radiation dose, highlights this approach. Although the absence of CBCT images in the study is a limitation, properly positioned panoramic radiographs can still provide valuable insights, especially in children, where reducing radiation exposure is of utmost importance.[28,29]

Limitations

In this retrospective study, the use of panoramic radiography as the imaging method limited the detection of small or early-stage PEIR lesions. Additionally, restricting the sample to the Southeastern Anatolia Region reduces the generalizability of the findings to other regions. Although analyses were conducted based on gender and dental arches, genetic and environmental factors could not be evaluated due to the retrospective nature of the study. The preference for panoramic radiography over cone-beam computed tomography (CBCT) further limited the diagnostic sensitivity.

Conclusions

In this retrospective cross-sectional study conducted with panoramic radiographs of children and adolescents aged 6-16 years in the Southeastern Anatolia Region of Turkey, the prevalence of PEIR was found to be 2.9%. PEIR was most commonly observed during the mixed dentition period and in mandibular permanent teeth. Although no significant difference was found between genders, PEIR was more prevalent in the mandible than in the maxilla. Our study is the first to report the prevalence of PEIR in the Southeastern Anatolia Region, contributing significantly to the literature and highlighting the importance of early diagnosis in clinical practice. Early detection of PEIR aims to halt lesion progression and improve dental prognosis through appropriate restorative interventions. Future studies are recommended to use advanced imaging techniques and include different regions for more comprehensive findings.

Conflict of Interest

The author has no conflicts of interest to declare.

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References

1. Gurdán Z, Balázs D, Pásti D, Fathi M, Maróti P, Kardos K, Pacheco A, Szalma J. Pre-eruptive intracoronal resorption in orthodontic patients: A retrospective analysis of 3,143 patients. Heliyon. 2023;9(8).
2. Seow WK. Pre-eruptive intracoronal resorption as an entity of occult caries. Pediatr Dent. 2000;22:370-376.
3. Le VNT, Kim JG, Yang YM, Lee DW. Treatment of pre-eruptive intracoronal resorption: A systematic review and case report. J Dent Sci. 2020;15(3):373-382.
4. Counihan KP, O'Connell AC. Case report: pre-eruptive intracoronal radiolucencies revisited. Eur Arch Paediatr Dent. 2012;13:221-226.
5. Ozden B, Acikgoz A. Prevalence and characteristics of intracoronal resorption in unerupted teeth in the permanent dentition: a retrospective study. Oral Radiol. 2009;25:6-13.
6. Seow WK, Wan A, McAllan LH. The prevalence of pre-eruptive dentin radiolucencies in the permanent dentition. Pediatr Dent. 1999;21(1):26-33.
7. Seow WK. Diagnosis and management of unusual dental abscesses in children. Aust Dent J. 2003;48(3):156-168.
8. Seow WK. Multiple pre-eruptive intracoronal radiolucent lesions in the permanent dentition: case report. Pediatr Dent. 1998;20:195-198.
9. Uzun I, Gunduz K, Canitezer G, Avsever H, Orhan K. A retrospective analysis of prevalence and characteristics of pre-eruptive intracoronal resorption in unerupted teeth of the permanent dentition: a multicentre study. Int Endod J. 2015;48(11):1069-1076.
10. de Souza N, Vaz A, Chalakkal P. Intracoronal radiolucency in an unerupted premolar: a rare occurrence. J Clin Diagn Res. 2017;11(1).
11. Wood PF, Crozier DSA. Radiolucent lesions resembling caries in the dentine of permanent teeth. A report of sixteen cases. Aust Dent J. 1985;30(3):169-173.
12. Al-Batayneh OB, AlTawashi EK. Pre-eruptive intra-coronal resorption of dentine: a review of aetiology, diagnosis, and management. Eur Arch Paediatr Dent. 2020;21:1-11.
13. Yüksel HT, Türkmenoğlu A, Çelikkol B, Evirgen Ş, Gulsahi K, Gulsahi A. Pre-eruptive intracoronal resorption of permanent dentition: A new classification and a multidisciplinary study. Aust Endod J. 2023;49(Suppl. 1):162-169.
14. Skillen WG. So-called "intra-follicular caries". Ill Dent J. 1941;10:307-308.
15. Wang Y, Chen J, Liu H. Prevalence of pre-eruptive intra-coronal radiolucency in Chinese children from panoramic radiographs. Chin J Dent Res. 2013;16(2):153-156.
16. Al-Batayneh OB, AlJamal GA, AlTawashi EK. Pre-eruptive intracoronal dentine radiolucencies in the permanent dentition of Jordanian children. Eur Arch Paediatr Dent. 2014;15(4):229-236.
17. Al-Tuwirqi A, Seow WK. A controlled study of pre-eruptive intra-coronal resorption and dental development. J Clin Pediatr Dent. 2017;41(5):374-380.
18. Manmontri C, Chompu-Inwai P, Mahasantipiya PM, Prapayasatok S. Prevalence of pre-eruptive intra-coronal radiolucencies in Thai children and adolescents: a retrospective study. J Investig Clin Dent. 2018;9(2).
19. Demirtas O, Tarim Ertas E, Dane A, Kalabalik F, Sozen E. Evaluation of pre-eruptive intracoronal resorption on cone-beam computed tomography: a retrospective study. Scanning. 2016;38(5):442-447.
20. Oenning AC, Jacobs R, Pauwels R, Stratis A, Hedesiu M, Salmon B, et al. Cone-beam ct in paediatric dentistry: dimitra project position statement. Pediatr Radiol. 2018;48:308-316.
21. Seow WK, Lu PC, McAllan LH. Prevalence of pre-eruptive intracoronal dentin defects from panoramic radiographs. Pediatr Dent. 1999;21(6):332-339.
22. Nik NN, Abdul Rahman R. Pre-eruptive intracoronal dentin defects of permanent teeth. J Clin Pediatr Dent. 2003;27(4):371-375.
23. Seow WK, Hackley D. Pre-eruptive resorption of dentin in the primary and permanent dentitions: case reports and literature review. Pediatr Dent. 1996;18(1):67-71.
24. Schwimmer Y, Zeltser R, Moskovitz M. Deep caries due to pre-eruptive intra-coronal resorption in a newly erupted primary molar. Int J Paediatr Dent. 2017.
25. Zilberman U, Milevski I, Yegorov D, Smith P. A 3000 year old case of an unusual dental lesion: pre-eruptive intracoronal resorption. Arch Oral Biol. 2019;97:97-101.
26. Hata H, Abe M, Mayanagi H. Multiple lesions of intracoronal resorption of permanent teeth in the developing dentition: a case report. Pediatr Dent. 2007;29:420-425.
27. Shimabukuro K, Konishi M, Wongratwanich P, Nagasaki T, Ohtsuka M, Suei Y, et al. Cone-beam computed tomography-based investigation of pre-eruptive intracoronal resorption prevalence. Odontology. 2024;112(1):256-263.
28. Apaydın BK, Yasar F, Kizildağ A, Tasdemir OU. Accuracy of digital panoramic radiographs on the vertical measurements of dental implants. Cumhuriyet Dent J. 2018;21(3).
29. Temur KT, Onsuren AS. Evaluation of antegonial angle, antegonial depth and gonial angle in sex prediction in the Turkish pediatric population of the Eastern Mediterranean Region. Cumhuriyet Dent J. 2022;25(Suppl):24-28.