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Original Research

Assessment of prevalence of over retained primary teeth in 6-12 years old children: an institutional study

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ABSTRACT:

Background: The deciduous teeth in the dental arch are referred to as over retained or persistent primary teeth (PPT) when they do not exfoliate even after the permanent tooth has erupted. **Aim**: The purpose of the study is to determine the prevalence of over retained primary teeth in children aged 6-12 years old from Indore city, India, and to relate the prevalence of malocclusion. **Materials and Methods**: In this retrospective study, a total of 960 panoramic radiographs were utilized. The images belonged to patients aged 6-12 years, of which 430 were female and 530 were male. Recorded data within the study comprises the age and gender of each patient, total number of PPT observed and for each PPT; its location, presence/absence of a permanent successor, and its status. **Results:** The prevalence of PPT was 4.47% in the study population. PPT were found more frequently in the maxilla (63.4%) and the most frequent PPT were maxillary canine (42.6%). Only 36.8% of PPT had congenital absence of their permanent successors. Tipping was seen in 3.3% of the adjacent teeth of PPT. 11% were infraoccluded.Overall,PPT was significantly associated with malocclusion in 45.6% study participants. **Conclusions:** PPT were observed in a significant number of children. The most common type of PPT seen on the dental arch was maxillary primary canines. Malocclusion were frequently observed in PPT.

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INTRODUCTION

Tooth eruption is described as the axial or occlusal movement of a tooth from its intraosseous location in the jaw to its functional position within the oral cavity and is an age-specific event. The eruption of deciduous teeth is followed by their exfoliation and eruption of permanent dentition.[1,2] These events occur over a broad chronological age range. However, most parents become anxious by the variation in the timing of eruption, considering it an important milestone of child development. Racial, ethnic, sexual, and individual factors can influence the eruption, and they are usually taken into consideration in determining the standards of the normal eruption.[3,4]

We now know a great deal more about the biology of tooth eruption. The existence of dental follicles, osteoclasts to establish an eruption channel through the alveolar bone, and osteoblasts to form new alveolar bone are known to be necessary for tooth eruption.[5,6] Tooth eruption cannot happen on its own if any of these processes are disturbed. A mechanical obstruction, syndromes, pathology, or other disturbances in the eruptive system are some of the multifactorial causes of tooth eruption disturbances.[7,8] In order to avoid potential clinical issues, such as the persistence of deciduous teeth, it is crucial to identify and treat any eruption irregularities that may arise during the transition from the primary to the permanent dentition.[9,10]

The deciduous teeth in the dental arch are referred to as retained or persistent primary teeth (PPT) when they do not exfoliate even after the permanent tooth has erupted.[11,12] The most frequent cause of primary tooth retention, which ranges from 0.3% to 11.3%, is the congenital absence of the permanent successor. Other significant elements that contribute to the

preservation of primary teeth include impaction and intrabony migration of the successor tooth.[13,14] For many years, a persistent deciduous tooth can stay problem-free in the dental arches if its crown, roots, and supporting alveolar bone are all intact.[15,16]PPT has several benefits, including maintaining space, halting the degradation of the alveolar bone that supports it, and postponing the requirement for prosthetic rehabilitation. On the other hand, PPT aresusceptible to ongoing root resorption or infraocclusion. Additionally, tipping at neighboring teeth due to infraocclusion might throw off the occlusion's equilibrium.[17,18]

The genesis, kind, longevity, and prognosis of PPT are the primary topics of very few articles in the literature.[19,20] The causative reasons and status of PPT in the dental arch are not, however, adequately explained by these research. Furthermore, there is no research on the prevalence of PPT, according to the most recent literature review.

The purpose of the study is to determine the prevalence of over retained primary teeth in children aged 6-12 years old from Indore city, India, and to relate the prevalence of malocclusion.

METHODS AND MATERIALS

Panoramic radiographs, belonging to children aged between 6 and 12 years, were utilized in this study. All the radiographs were obtained from the archive of the Department of Pediatric Dentistry during the patients' first dental examination. The same panoramic radiography device was used for radiographs of all patients. A primary tooth was recorded as persistent; if the primary tooth did not exfoliate; although, the eruption time of permanent successor tooth had been expired for >1 year.

In cases where the patient had a known diagnosis of ectodermal dysplasia or craniofacial anomaly, as well as the cases where the patient had undergone orthodontic treatment or had a tooth extraction, their radiographs were excluded from the study. In addition, poor quality (i.e., abnormal density and contrast, errors from positioning and mechanical situations) panoramic radiographs and radiographs belonging to patients with lacking information were eliminated.

All radiographic examinations were carried out by two pediatric dentists who were properly trained and calibrated. The interexaminer reliability was calculated after examining 100 radiographs and kappa value was 0.81. Information forms were prepared to record data such as patients' age, gender, total number and type of PPT observed, presence of the permanent successor, fillings, carious lesions, root canal treatment,periapical lesion, root resorption, and any infraocclusion of the persistent teeth, tipping of adjacent teeth [Table 1]. Root resorption in PPT's is hard to measure quantitatively unless all radiographic images have the same perspective. Thus, root resorption was evaluated qualitatively, only to determine its existence. Root resorption was recorded as present when observed some root shortening and/or irregular contour of roots in related PPT. In cases, persistent teeth's occlusal plane was observed to be below the adjacent teeth's occlusal plane and examined teeth were recorded as infraoccluded.

Statistical Analysis

Data were analyzed using MedCalc Statistical Software version 12.7.7 (MedCalc Software BVBA, Ostend, Belgium). Descriptive analysis was made expressing the results as percentages and frequencies. The Chi-squared test (or Fisher's exact test at appropriate locations) was used to examine the relationship between categorical variables. Statistical significance was set at $P < 0.05$.

RESULTS

Table1: Distribution of persistent primary teeth by gender

	Total	Male	Female	P value
Total number of patient	960	530	430	<0.05
Number of patient who had PPT	43	17	26	
Percentage	4.47	3.20	6.04	

In the present panoramic radiographic-based study, radiographs of 960 children and adolescents (530 males and 430 females) were evaluated. Five hundred and eighty-four PPT were determined at 43 patients (17 males and 26 females) among the reviewed 960 radiographs. The average age of the examined patients was 9.2 years. The prevalence of PPT was 4.47%. The difference in the prevalence of PPT between genders was statistically significant. In girls, the prevalence of PPT was 6.02%, whereas 3.2% in boys. (Table 1)

Table 2: Descriptive features of patients with persistent primary teeth

Number of PPT	
1-3	92.7%
4-6	6.8%
6+	0.6%
Types of PPT*	
Central	9.0%
Lateral	11.4%

Canine	49.6%
First molar	2.5%
Second molar	27.7%
Permanent tooth germ*	
Presence	63.4%
Absence	36.6%
Location*	
Maxilla	62.5
Mandible	37.5

As shown in Table 2 , 92.7% patients had 1–3 PPT and 6.8% patients had 4–6 PPT, whereas only 0.6% had >6 PPT. The most common type of PPT was canines (49.6%) followed by second molars (27.7%), lateral incisors (11.4%), central incisors (9.0%), and first molars (2.4%). PPT were found most frequently in the maxilla (63.4%) than in the mandible (36.6%). Considering the status of the PPT, 21.8% were observed to be intact and remaining had at least one condition. 38.0% had root resorption, 11% were infraoccluded, 10.9% had fillings, 10.3% had dental caries, 4.4% had periapical lesion, 3.4% had tipping in their adjacent teeth, and only 0.5% had root canal treatment. The most common PPT on the dental arch was maxillary primary canines 42.5%, followed by mandibular primary second molars 20.6%, and maxillary primary lateral incisors 13.3%. 36.7% developmental absence of permanent teeth was the reason as to why primary teeth were persistent, whereas permanent teeth germs were present in the remaining 63.3%. The presence of permanent tooth germ was associated with the type of PPT ($P < 0.05$). A substantial amount of primary lateral and secondary molar PPT was observed without permanent teeth germs, whereas primary central incisor, canine and first molar type of persistent teeth mostly had permanent teeth germs [Table 2].

Table 3: The relation between the presence or absence of PPT and malocclusion

PPT	No of patients with malocclusion	Percentage of patients with malocclusion	P value
Present (n=43)	21	45.6%	<0.005
Absent (n=917)	104	11.34%	

PPT was significantly associated with malocclusion (45.6%).(Table 3)

DISCUSSION

The present research focuses on the prevalence of PPT and their various characteristics. In literature, there are no previous studies about the incidence of PPT and limited data are available regarding their clinical situation, distribution, and the reasons for persistence. In accordance, this is the first retrospective radiographic study of a large and young population with PPT. The PPT prevalence was found to be 4.47% in the study population, in which participant age ranged from 6 to 12. The frequency of retained primary teeth observation will decrease as the age increases because PPTs can be extracted due to various reasons. Therefore, one of the main factors in determining participant age range was not to overlook extracted PPT, and the subpopulation was chosen to be as young as possible while also keeping the data set rich. Other studies regarding PPT utilize a broader age range which makes their results incomparable to this study.[15,16]

The results of the study showed that the primary maxillary canines were the most common type of persistent deciduous teeth, followed by the primary mandibular second molars, and lateral incisors on both sides. The persistence of other primary teeth was observed rarely. These results were in agreement with IşıkAslan et al.[15] However, Aktan et al. found that the primary mandibular second molars were the most frequently PPT, followed by the primary maxillary canines.[16] The broader age range and location of their study could lead the difference in results.

In the present study, developmental absence of the permanent teeth was found in 36.7% of PPT. This finding is compatible with previous studies that focus on understanding why primary teeth have persisted and the relationship between agenesis of permanent teeth and the persistence of primary teeth.[17] Previous studies showed that the most common reason for the persistence of primary teeth was developmental absence of the permanent successor teeth, followed by impaction, transposition, and delayed eruption of successor teeth. However, the primary reason for persistence may differ among teeth types. Most of the primary incisors and second molars mainly persist due to developmental absence of their successors. Notwithstanding, most of the persistent primary canine teeth was present with their permanent canines. Impaction or transposition of permanent canines and congenital absence of permanent lateral incisors lead persistence of primary canine teeth. In consideration of these findings, the persistence of primary teeth may be related to developmental anomalies of the adjacent teeth or their permanent successors for the results of the present study.

When successor teeth erupt, the roots of the primary teeth in a healthy dentition continuously resorb.

Although a number of theories have been put out to explain the elements influencing this process, none of them have provided a clear explanation of cause and effect. Occlusal trauma, inflammatory processes, and the pressure of erupting permanent teeth have all been thought to contribute to the mechanism. On the other hand, root resorption in primary teeth typically happens while permanent teeth are not developing. The rate of root resorption declines with age and varies greatly between persons.[18,20] Due to surveying constraints with panoramic radiographs, a reliable quantitative measurement of root length could not be made in this investigation.Kjaer et al[14] and Kurol and Thilander[18] reported that PPT prognosis was poor in the long-term.

In our study, PPT was significantly associated with malocclusion (45.6%)Infraocclusion is detected when the rate of a tooth's crown height to its neighbor's is low. When the retained primary tooth positioned below the level of the occlusal plane, interocclusal space increases and infraocclusion occurs.[8] In the study by Bjerklin and Bennett, infraocclusion has been observed in 55% of the persistent mandibular second molars.[9]Aktan et al. reported that infraocclusion ratio was 79% for retained primary teeth in their study.[16]Infraocclusion is frequently caused by tipping of the adjacent permanent teeth. In the present study, tipping of the adjacent permanent teeth was observed in 30.4% teeth. Panoramic radiography has integral limitations due to its technical nature. Images produced with this technique are usually distorted and flawed. The radiographic projections are not completely consistent among all patients due to different teeth morphologies causing variance in beam directions. Moreover, the patient's head posture plays a similar role as the tooth morphology and variation among postures result in specific rendition and enlargement. In particular, children might make movements during observation, resulting in "shaking" and a lack of clarity. These distorted and inconsistent images may lead to uncertainty in determination of clinical conditions.

CONCLUSION

Based on this study's findings, the following conclusions can be made:

1. PPT were observed in a significant number of children aged 6-12 years
2. The most common type of PPT seen on the dental arch was maxillary primary canines, followed by mandibular primary second molars
3. Malocclusion was frequently observed condition for PPT.

REFERENCES

1. Matsuzaki H, Yanagi Y, Katase N, Nagatsuka H, Hara M, Ashida M, et al. Case series: Conditions inhibiting eruption of permanent first molars. Pediatr Dent 2013;35:67-70.
2. Suri L, Gagari E, Vastardis H. Delayed tooth eruption: Pathogenesis, diagnosis, and treatment. A literature review. Am J OrthodDentofacialOrthop 2004;126:432-45.
3. Wise GE, Frazier-Bowers S, D'Souza RN. Cellular, molecular, and genetic determinants of tooth eruption.Crit Rev Oral Biol Med 2002;13:323-34.
4. Noda T, Takagi M, Hayashi-Sakai S, Taguchi Y. Eruption disturbances in Japanese children and adolescents. Pediatr Dent J 2006;16:50-6.
5. Vastardis H. The genetics of human tooth agenesis: New discoveries for understanding dental anomalies. Am J OrthodDentofacialOrthop 2000;117:650-6.
6. Polder BJ, Van't Hof MA, Van der Linden FP, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. Community Dent Oral Epidemiol 2004;32:217-26.
7. Buyuk SK, Ozkan S, Benkli YA, Arslan A, Celik E. Evaluation of the skeletal and dental effects in orthodontic patients with maxillary lateral incisor agenesis. J EsthetRestor Dent 2017;29:284-90.
8. Robinson S, Chan MF. New teeth from old: Treatment options for retained primary teeth. Br Dent J 2009;207:315-20.
9. Bjerklin K, Bennett J. The long-term survival of lower second primary molars in subjects with agenesis of the premolars.Eur J Orthod 2000;22:245-55.
10. Ith-Hansen K, Kjaer I. Persistence of deciduous molars in subjects with agenesis of the second premolars. Eur J Orthod 2000;22:239-43.
11. Haselden K, Hobkirk JA, Goodman JR, Jones SP, Hemmings KW. Root resorption in retained deciduous canine and molar teeth without permanent successors in patients with severe hypodontia. Int J Paediatr Dent 2001;11:171-8. 54
12. Sletten DW, Smith BM, Southard KA, Casko JS, Southard TE. Retained deciduous mandibular molars in adults: A radiographic study of long-term changes. Am J OrthodDentofacialOrthop 2003;124:625-30.
13. Bjerklin K, Al-Najjar M, Kårestedt H, Andrén A. Agenesis of mandibular second premolars with retained primary molars: A longitudinal radiographic study of 99 subjects from 12 years of age to adulthood. Eur J Orthod 2008;30:254-61.
14. Kjaer I, Nielsen MH, Skovgaard LT. Can persistence of primary molars be predicted in subjects with multiple tooth agenesis? Eur J Orthod 2008;30:249-53.
15. IşıkAslan B, ZafersoyAkarslan Z, Uzuner FD. Radiographic evaluation of the distribution and condition of persistent primary teeth.ActaOdontolTurc 2013;30:77-84.
16. Mishra BP, Harish A, Mathew AM, Pradhan A, Sneha S, Murty V, Makkad RS. Management of zygomatic fractures using different surgical approaches. Bioinformation. 2023; 31;19(13):1371-1376. doi: 10.6026/973206300191371.
17. Aktan AM, Kara I, Sener I, Bereket C, Celik S, Kirtay M, et al. An evaluation of factors associated with persistent primary teeth. Eur J Orthod 2012;34:208-12.
18. Altug-Atac AT, Erdem D. Prevalence and distribution of dental anomalies in orthodontic patients. Am J OrthodDentofacialOrthop 2007;131:510-4.
19. Kurol J, Thilander B. Infraocclusion of primary molars and the effect on occlusal development, a longitudinal study. Eur J Orthod 1984;6:277-93.
20. Hvaring CL, Øgaard B, Stenvik A, Birkeland K. The prognosis of retained primary molars without successors: Infraocclusion, root resorption and

restorations in 111 patients. Eur J Orthod 2014;36:26-30.
21. Harokopakis-Hajishengallis E. Physiologic root resorption in primary teeth: Molecular and histological events. J Oral Sci 2007;49:1-2.
22. Rune B, Sarnäs KV. Root resorption and submergence in retained deciduous second molars. A mixed-longitudinal study of 77 children with developmental absence of second premolars.Eur J Orthod 1984;6:123-31.