

## Root Resorption in Retained Primary Teeth without Successors among Sulaimani Adult Population

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### ABSTRACT

**Introduction:** This study was performed to assess the root resorption of retained primary teeth having no successors.

**Methods:** According to the selection criteria, 2232 students were diagnosed and selected. The statistical analysis was performed by using a statistical software IBM SPSS version 21.

**Results:** only 83 subjects had retained deciduous teeth (R.D.T) giving percentage of 3.71%. Periapical radiographs were used to assess the resorption of the roots. Furthermore, 126 roots was found in the (95) R.D.T, (66) roots was in males and (60) was in females and all roots have some form of resorption. No significant relationship was observed between different variables (arch, gender, and sides) and the root resorption, (P value =0.138, 0.1258 and 0.176) respectively of P <0.05.

**Conclusion:** Within the limitation of the study, the primary maxillary canine were the most frequently retained deciduous teeth, followed by the mandibular 2<sup>nd</sup> primary molar, but the maxillary central incisor and mandibular 1<sup>st</sup> molar are the least. Regarding levels of root resorption, the level 1 root resorption was the most frequent 51.6 %, followed by level 2, level 3 & level 4 respectively; 23.8%, 14.3% & 10.3%.

**KEYWORDS:** Retained primary teeth (RPT), Root Resorption, Resorption level.

### INTRODUCTION

Primary teeth usually remain in place beyond the time they would otherwise be shed when agenesis occurs in the permanent dentition. Retained primary teeth function as space maintainers, keep the alveolar bone prevented from resorption, may serve as a semi-permanent solution long into adulthood, and delay the need for prosthetic replacement. A retained deciduous tooth, with good crown, roots, and supporting alveolar bone, can offer an adult patient many years of service. Thus, most of the deciduous teeth studied can continue to function.<sup>1</sup>

Just a few number of publications were found on the persistence of deciduous teeth (Bjerklin and Bennett, 2000; Ith-Hansen and Kjaer, 2000; Haselden et al., 2001; Sletten et al., 2003; Bjerklin et al., 2008; Kjaer et al., 2008; Robinson and Chan, 2009; A.M Aktan et al., 2012).<sup>2-7</sup> In cross-sectional studies, the most frequently retained primary tooth was the mandibular second primary molar, followed by the maxillary deciduous

canine. The longest lifespan was determined for mandibular primary canines, followed by maxillary canines. The degree of the root resorption of the primary teeth was found in previous studies to be unaltered in 77 per cent of the study participants, 15 years later.<sup>7</sup>

The radiographic-based studies provide little or no information about the reasons for the persistence of primary teeth. The most common reason being developmental absence of the permanent successor.<sup>6</sup> Congenital absence of one or a few permanent teeth without any systemic disorders is regarded as an autosomally inherited dominant condition with varying gene expression and incomplete penetrance.<sup>8</sup> Another reason could be an impaction or intra-bony migration of the successor tooth.<sup>9, 10</sup>

When a retained deciduous tooth is non-mobile, functioning, and meets a patient's aesthetic standards, there is justification for maintaining the tooth. The

advantages to retaining a healthy deciduous tooth include the psychological benefits of a person keeping their own tooth and the ability for that tooth to maintain the surrounding bone and soft tissue. However, severe mobility, extensive caries, root resorption, and fracture are reasons a deciduous tooth may not be able to be retained.<sup>1</sup>

Hopeless retained deciduous teeth without permanent successors certain clinical problems for patients. Compromised aesthetics, shifting of adjacent teeth, altered occlusion, and super eruption of teeth are examples of problems that can arise when a permanent tooth is congenitally missing.<sup>11</sup>

The forces that applied on deciduous teeth become heavier than the primary tooth periodontal ligament can withstand as the face grows and the muscles of mastications enlarge.<sup>12</sup> The primary tooth PDL ultimately weaken by these constant and overwhelming forces and/or cause PDL necrosis, which in turn induces local production of cytokines that affect the macrophages and monocytes to be recruited. Then, the recruited macrophages and monocytes will be activated and differentiated to active odontoclast by IL-1, prostaglandin E2 and TNF- $\alpha$  induced by PDL fibroblasts. Once the PDL is damaged, the root protection is lost, and Resorption starts. Another etiology is a mechanical trauma, abnormal occlusion condition i.e. permanent teeth in one arch occluding with primary teeth in another arch which cause initiation of the above cascade in the susceptible primary tooth-PDL.<sup>13</sup>

**MATERIAL AND METHODS**

**Sample Characteristics**

The sample size was 2232 students of Sulaimani University including 1064 males and 1168 females. Their ages ranged between 18-22 years old that were collected from randomly selected colleges and these

students pooling from different areas of Sulaimani Governorate. They were diagnosed and selected according to the selection criteria.

**Exclusion Criteria**

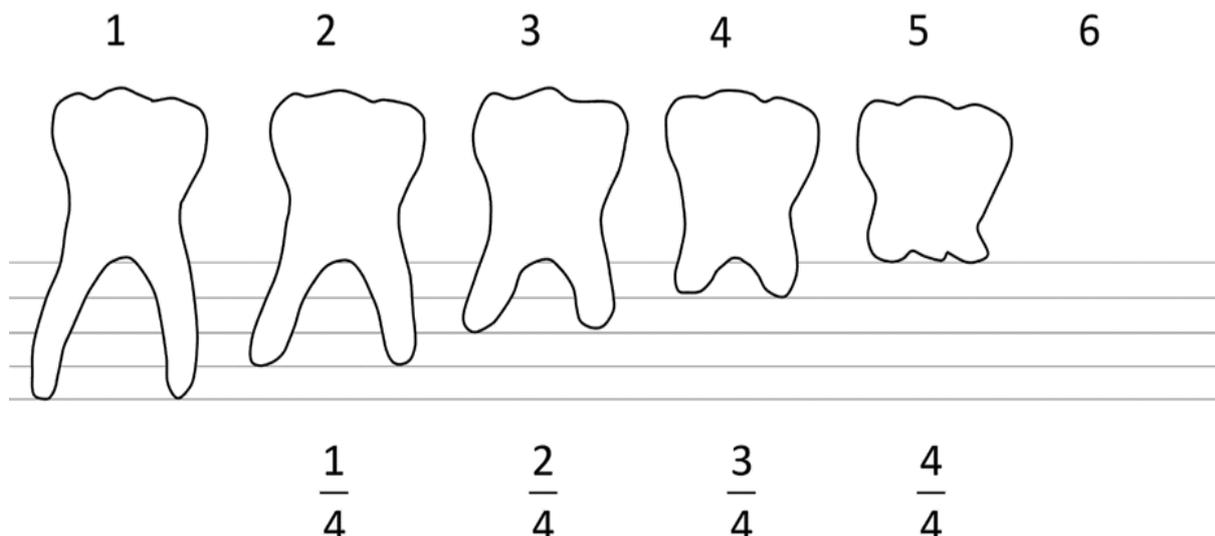
Students with following criteria were excluded:-

1. Students not from Sulaimani province origin.
2. History of previous orthodontic treatment.
3. Having systemic diseases (Cleidocranial Dysplasia, Cretinism and Cleft lip and /or palate).
4. History of severe trauma like jaw fracture.
5. Sign of any congenital facial deformity.
6. Impaction and abnormal position of successor teeth

This study was done to examine a sample of 2232 students that has been randomly selected by simple random sampling method from a number of colleges of Sulaimani University which include college of dentistry; science; human science; sports; and nursing, to identify the prevalence of retained deciduous teeth among students aged between 18-22 years old.

Both upper and lower arches were thoroughly examined clinically with naked eyes under natural day light, directly and indirectly using a dental mirror for every case, starting from upper left second premolar to upper right second premolar and then from the lower right second premolar to the lower left second premolar, any case which satisfying with our sample criteria was recorded in the specially designed case sheet for each case.

Students with retained deciduous teeth were subjected to periapical radiograph, and the amount of root resorption were measured according to Bjerklin and Bennett, 2000<sup>2</sup> the examination of the roots consisted of a subjective judgment of root resorption, (Fig 1) and each root was registered separately, also single-rooted teeth were judged according to template. The examination was done by two investigators.



**Fig 1: The resorption stages, measuring quarters of each root. Bjerklin and Bennett (2000)<sup>2</sup>**

The statistical analysis was performed by using a statistical software IBM SPSS version 21. Chi squares and P-value were used to find the relationships between different variables with the root resorption.

**RESULTS**

Out of 2232 students, 83 subjects had R.D.T giving percentage of 3.71%, out of 1064 male students 37 subjects had R.D.T giving percentage of 3.47% which had 49 teeth giving percentage of 4.6 and in females we found 46 subjects among 1168 gives the percentage of 3.93 that had 67 teeth giving percentage of 5.73%.

Statistically, no significant relationship was observed between gender and root resorption as P value<0.05 (Table 1)

**Distribution of Root Resorption according to Number and Percentage of Retained Deciduous Teeth for Males and Females**

Out of (83) retained cases, (69) cases had returned for taking X-ray as shown in table 2.

These (69) students include (31) males giving percentage of (44.92%) and in females we found (46) cases gives the percentage of (55.08%). These (69) students had (95) R.D.T that consist of (46) teeth for males giving the

percentage of (48.43%) and (49) females giving the percentage of (51.57%).

Furthermore, 126 roots was found in the (95) R.D.T, (66) roots was in males and (60) was in females and all roots have some form of resorption (Table 3).

The type of root resorption among RDT in relation to dental arch, gender, and right and left are determined and the result finds no significant statistical differences between the different variables and the type of root resorption. In the present study, the level 1 root resorption (1/4) are the most frequent 51.6 %, followed by level 2 (2/4), level 3(3/4) & level 4 (4/4) respectively; 23.8%, 14.3% & 10.3% . (Table 3, 4, 5)

The Mandibular deciduous 2<sup>nd</sup> molar was the most frequent tooth among level 1 root resorption (32) and the second most frequent among level 2 (10). The maxillary deciduous canine is most frequent tooth with level 2 root resorption (14) and the 2<sup>nd</sup> most common among level 1 group (29), as shown in table 7.

The number of RDT roots with resorption that present according to the type of teeth in both arches, shows the maxillary canine with the highest frequency of resorption (56) followed by mandibular second molar (47). While, maxillary central incisor and mandibular 1<sup>st</sup> molar are the least (0) as shown in fig 4.

**Table 1: Comparison of distribution of retained deciduous subjects and teeth in the sample according to genders.**

Gender	No. of Sample	R.D.T Subject	% of R.D.T Subject	R.D.T	% of R.D.T	X <sup>2</sup> (R.D.T subjects)
Males	1064	37	3.47%	49	4.6%	X <sup>2</sup> =0.330 d.f=1 P=0.56569 N.S*
Females	1168	46	3.93%	67	5.73%	
Total	2232	83	3.71%	116	5.19%	

\*N.S = not significant statistically at P<0.05

**Table 2: Distribution of retained deciduous teeth (R.D.T) with X-ray in the sample for both genders.**

Gender	R.D.T Subjects	R.D.T with X-ray	R.D.T without X-ray
Males	37	31	6
Females	46	38	8
Total	83	69	14

**Table 3: Number of roots in R.D.T for both genders.**

Gender	No. of cases R.D.T with X-ray	No. of R.D.T with X-ray	No. of roots in R.D.T
Males	31	46	66
Females	38	49	60
Total	69	95	126

**Table 4: Type of RDT root resorption in relation to the arch**

Arch	No. of total types of root resorption					Chi square P value
	1/4 (level 1) No. (%)	2/4 (level 2) No. (%)	3/4 (level3) No. (%)	4/4 (level4) No. (%)	Total	
Maxilla	32	18	13	10	74 (58.73%)	X <sup>2</sup> =5.5 P=0.138 N.S
Mandible	33	12	5	3	52 (41.27%)	
Total	65 (51.6%)	30 (23.8%)	18 (14.3%)	13 (10.3%)	126 (100%)	

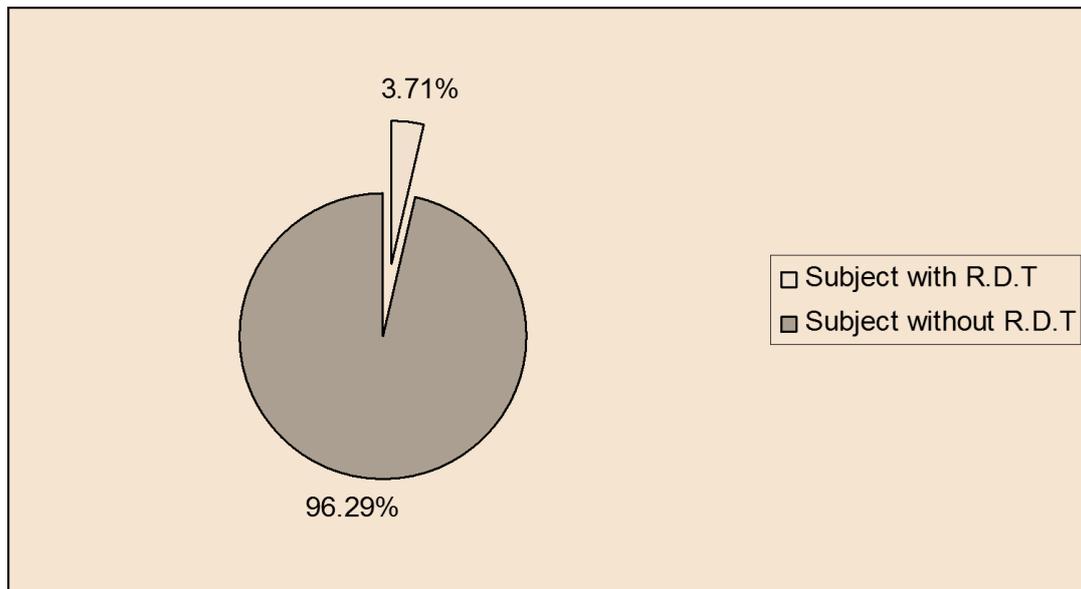


Fig 2: Percentage of R.D.T in the examined sample.

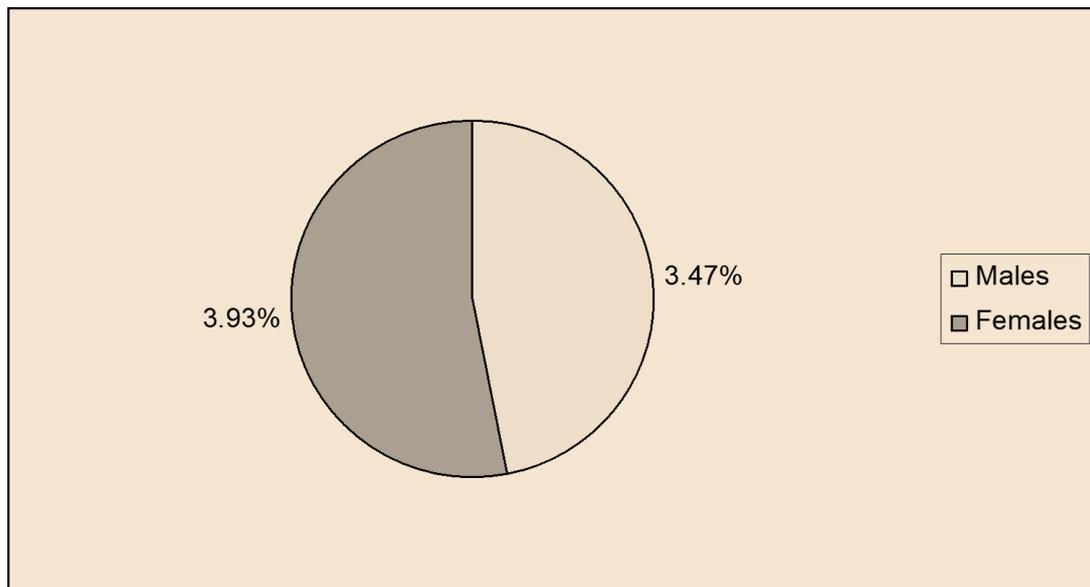


Fig 3: Percentages of R.D.T for both males and females.

Table 5: Type of RDT root resorption in relation to the gender

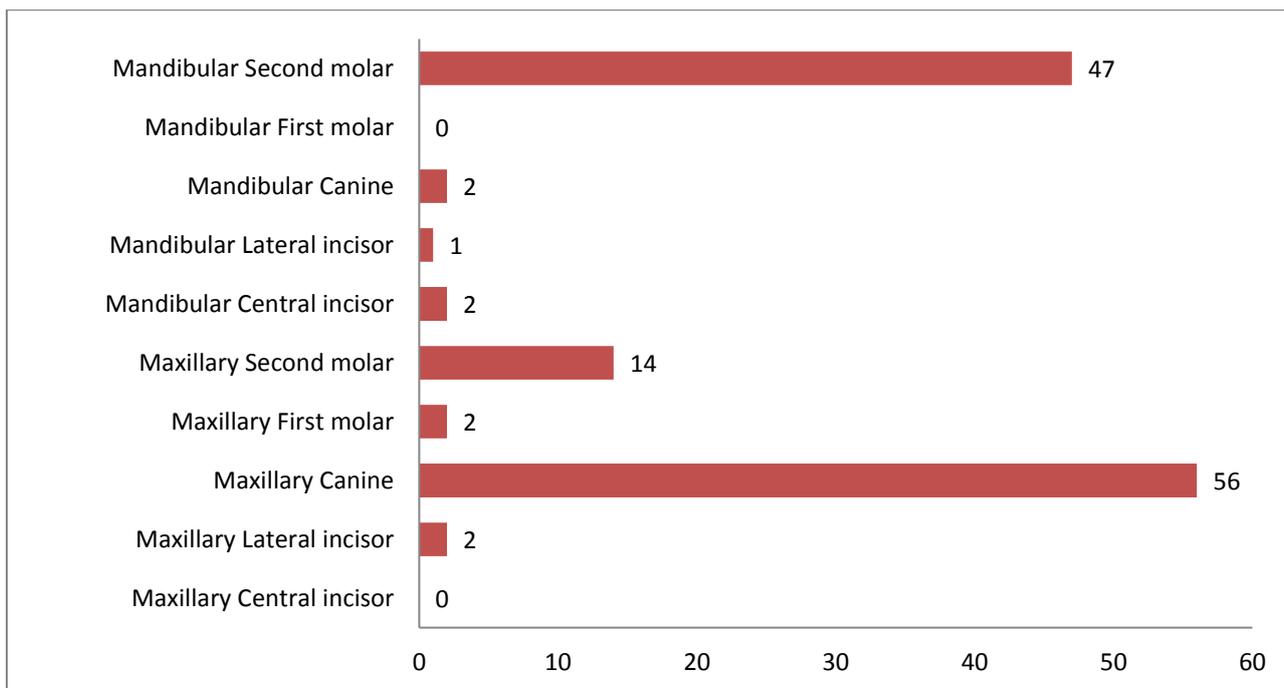
Gender	No. of total types of root resorption					Chi square P value
	1/4 (level 1)	2/4(level 2)	3/4 (level3)	4/4 (level4)	Total	
	No. (%)	No. (%)	No. (%)	No. (%)		
Male	35	14	13	4	66 (52.38%)	X <sup>2</sup> =5.72 P=0.1258 N.S
Female	30	16	5	9	60 (47.62%)	
<b>Total</b>	65 (51.6%)	30 (23.8%)	18 (14.3%)	13 (10.3%)	126 (100%)	

Table 6: Type of RDT root resorption in relation to the right and left

Side	No. of total types of root resorption					Chi square P value
	1/4 (level 1)	2/4(level 2)	3/4 (level3)	4/4 (level4)	Total	
	No. (%)	No. (%)	No. (%)	No. (%)		
Right	36	17	9	3	65 (51.59%)	X <sup>2</sup> =4.93 P=0.176 N.S
Left	29	13	9	10	61 (48.41%)	
<b>Total</b>	65 (51.6%)	30 (23.8%)	18 (14.3%)	13 (10.3%)	126 (100%)	

**Table 7: Number of RDT roots with different levels of root resorption in relation to the tooth type.**

Arch	Tooth type	No. of total types of root resorption			
		1/4 (level 1)	2/4 (level 2)	3/4 (level3)	4/4 (level4)
Maxillary	Central incisor	0	0	0	0
	Lateral incisor	1	0	1	0
	Canine	29	14	4	9
	First molar	0	0	2	0
	Second molar	2	5	6	1
Mandibular	Central incisor	0	0	2	0
	Lateral incisor	0	1	0	0
	Canine	1	0	1	0
	First molar	0	0	0	0
	Second molar	32	10	2	3



**Fig 4: Number of RDT roots with resorption in relation to a tooth type.**

## DISCUSSION

In the present study, the congenital missing of the permanent successor teeth was found to be the reason for the persistence of primary teeth. There is no statistical significant differences found between male and female, upper arch and lower arch, right and left in the number and percentage of the retained primary tooth root resorption.

The results showed that the primary maxillary canine were the most frequently retained deciduous teeth, followed by the mandibular 2<sup>nd</sup> primary molar on both sides. These results were compatible with previous studies Bjerklin K et al, 2008 and A M Aktan et al. 2010<sup>4,14</sup> that showed the prevalence of tooth agenesis and the relationship between agenesis of permanent teeth and the persistence of primary teeth. Similar to the result of the present study, primary maxillary canine and mandibular 2<sup>nd</sup> primary molar were most frequently retained deciduous teeth, but different in that, primary

mandibular second molars persist most often due to developmental absence of successors permanent mandibular second premolars and the most frequent impaction of maxillary permanent canines leads to second most common persistence rate of primary maxillary canines.

In normal dentition, the primary tooth roots subject to gradual resorption simultaneously with the eruption of the successors. The normal interrelationship between the eruption of a permanent tooth and the resorption of the primary tooth is well understood, but the resorption of the primary tooth root is also generally viewed as a process that can occur when the underlying permanent tooth is absent. In absence of the permanent tooth, if the root and coronal structure of a retained primary tooth are good, the tooth is functionally and aesthetically acceptable, and there is no compelling orthodontic need for extraction.<sup>7</sup>

In the present study, the level 1 root resorption (1/4) are the most frequent 51.6 %, followed by level 2 (2/4), level 3(3/4) & level 4 (4/4) respectively; 23.8%, 14.3% & 10.3%. This is in agreement with A.M Aktan et al., 2012<sup>7</sup> in which the resorption level 1 was more related to the congenitally missing successors of the primary teeth and the level 5 was less related to the congenitally missing successors. This result suggested that if the persistent teeth were related to the congenital absence of successor teeth, less resorption of the primary teeth roots were encountered.

The Mandibular 2<sup>nd</sup> molar was the most frequent tooth among level 1 (32) and the second most frequent among level 2 (10). The maxillary deciduous canine is most frequent tooth with level 2 root resorption (14) and the 2<sup>nd</sup> most common among level 1 group (29). This result is in agreement with the result of a study done by A.M Aktan et al., 2012<sup>7</sup> in that the resorption level 1 was higher for mandibular primary molars but unlike the present study, in maxillary primary canines, the level 1 was the highest than other level groups.

One of the limitations in the present study can be due to radiography, because there is not a confident quantitative measurement of root length due to distorted radiographic material and the object is three-dimensional and projected photographically down to two planes. This may result in uncertainty in the scoring of the degree of root resorption. Additionally, the patient's head posture, according to beam direction, is important. Most likely, the patients were positioned differently, and different angulation of the tube can result in elongation or shortage of the periapical radiographic images.

## CONCLUSION

Within the limitation of the present study, the primary maxillary canine were the most frequently retained deciduous teeth, followed by the mandibular 2<sup>nd</sup> primary molar on both sides. The level 1 root resorption are the most frequent followed by level 2, 3 4 respectively.

## REFERENCES

1. Sletten D W, Smith B M, Southard K A, Casco J S, Southard T E. Retained deciduous mandibular molars in adults: a radiographic study of long-term changes. *American Journal of Orthodontics and Dentofacial Orthopedics* 2003; 124: 625–630.
2. Bjerklin K, Bennett J. The long-term survival of lower second primary molars in subjects with agenesis of the premolars. *European Journal of Orthodontics* 2000; 22: 245–255.
3. Haselden K, Hobkirk J A, Goodman J R, Jones S P, Hemmings K W. Root resorption in retained deciduous canine and molar teeth without permanent successors in

patients with severe hypodontia. *International Journal of Paediatric Dentistry* 2001; 11: 171–178.

4. Bjerklin K, Al-Najjar M, Karestedt H, Andren A. Agenesis of mandibular second premolars with retained primary molars: a longitudinal radiographic study of 99 subjects from 12 years of age to adulthood. *European Journal of Orthodontics* 2008; 30: 254–261.
5. Kjaer I, Nielsen M H, Skovgaard L T. Can persistence of primary molars be predicted in subjects with multiple tooth agenesis? *European Journal of Orthodontics* 2008; 30: 249–253.
6. Robinson S, Chan M F. New teeth from old: treatment options for retained primary teeth. *British Dental Journal* 2009; 207: 315–320.
7. Ali Murat Aktan, Isa Kara, Ismail Sener, Cihan Bereket, Salih Çelik, Mustafa Ki. An evaluation of factors associated with persistent primary teeth. *European Journal of Orthodontics* 2012; 34:208–212.
8. Arte S, Nieminen P, Pirinen S, Thesleff I, Peltonen L. Gene defect in hypodontia: exclusion of EGF, EGFR, and FGF-3 as candidate genes. *Journal of Dental Research* 1996 Jun; 75(6):1346-52.
9. Joshi M R. Transmigrant mandibular canines: a record of 28 cases and a retrospective review of the literature. *Angle Orthodontist* 2001; 71: 12–22.
10. Shapira Y, Kuftinec MM. Intrabony migration of impacted teeth. *Angle Orthodontist* 2003; 73: 738–743discussion 744.
11. Mattheeuws N, Dermaut L, Martens G. Has hypodontia increased in Caucasians during the 20th century? A meta-analysis. *European Journal of Orthodontics* 2004;26(1):99-103.
12. Avery JK. *Oral development and histology*. 3rd ed, Thieme, New York 2002, 134-140.
13. Evlambia Harokopakis-Hajishengallis. Physiologic root Resorption in primary teeth: molecular and histological events. *Journal of oral science* 2007. 49(1); 1-12.
14. Aktan A M, Kara S, Akgunlu F, Malkoc S. The incidence of canine transmigration and tooth impaction in a Turkish subpopulation. *European Journal of Orthodontics* 2010; 32: 575–581.

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