

PREVALENCE OF DOUBLE (FUSED/GEMINATED) PRIMARY TEETH IN TURKEY — A STUDY

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ABSTRACT

The purposes of this study was to investigate the prevalence of primary double (fused / geminated) teeth in a group of Turkish children and to compare the distribution of different types of double primary teeth and their relationship to permanent successors.

4619 dental records of Turkish children in the age range of 2 to 12 years were examined in the dental faculty hospital, Erciyes University Turkey between 2005 and 2010 and were included in this study. Radiographs and photographs of these children were also taken at the time of examination. The data (age, sex and systemic disease or syndrome) were obtained from the patient files and analyzed for double teeth. The occurrence of double primary teeth and their effects on the permanent dentition were also recorded.

The prevalence of double primary teeth in children under 12 years of age in this study was 0.38%. 22 double primary teeth were detected. 45.4% were mandibular lateral incisors and canines 81.8% of cases experienced further problems in the permanent successors. Hypodontia (77.2%) was the common problem in the permanent successors.

The affiliation between double primary teeth and permanent successors justifies radiographic examination to evaluate the number and condition of permanent successors and to determine a proper treatment plan.

Key words: Double teeth, dental anomaly, fusion, gemination.

INTRODUCTION

Dental anomalies of number and forms may occur in the primary and permanent dentition.^{1,2} The terms such as 'double tooth', 'joined teeth', or 'fused teeth' are often used to describe gemination and fusion, both of which are primary developmental abnormalities of the teeth.³⁻⁵ Fusion has been described as a developmental

anomaly characterized by the union of two adjacent teeth. This union of two separate tooth germs may be either complete or incomplete. Fused teeth have separate or shared pulp chambers and canals.⁶ There will be one less tooth in the arch than normal if the affected tooth is counted as one.⁷ Gemination is a developmental anomaly of form, which is recognized as an attempt

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by a single tooth germ to divide resulting in a large single tooth with bifid crown and usually common root and root canal.⁸ Fusion may be differentiated from gemination by the presence of two separate roots or a single root, and by counting the teeth.⁹ However, these definitions also make differentiation between fusion and gemination difficult when fusion involves a normal tooth and a supernumerary tooth. In cases of fusion, the crowns are united by enamel and/or dentine, but there are two roots or two canals in a single root. In contrast, in gemination, the structure most often presents two crowns, either totally or partially separated, with a single root and one root canal.¹⁰ These types of anomalies may be unilateral or bilateral and may affect either dentition, although the primary teeth are more commonly affected. Bilateral dental fusion in the primary dentition is a rare dental anomaly.¹¹

Studies of the prevalence of double teeth in primary dentition are summarized in Table 1.¹²⁻²⁵ The frequency of double teeth varied from 0.1% to 1.6% (1 to 16 per 1000) despite the variation in the age and region of the group examined. Bilateral presentation was very rare. A survey of the literature has revealed prevalence estimates for bilateral double teeth ranging from 0.01 to 0.04% in the primary, and 0.05% in the permanent dentition.⁷⁻²⁴ Epidemiological studies showed that the prevalence of fused teeth was similar for girls and boys and occurred most frequently in the primary dentition.²⁶

The etiology of double teeth may be attributed to evolution, trauma, heredity and environmental factors.⁵ Fusion is believed to occur due to physical force or pressure on adjacent tooth germs, which lead to their contact and fusion before calcification.²⁷ Although the etiology of gemination is unknown,²⁸ there is some evidence that the condition has a familial tendency.²⁹ Double teeth may also be part of syndromes such as achondrodysplasia and chondroectodermal dysplasia.³⁰ They have been reported predominantly in the anterior region, with incisors and canines being most frequently affected.³¹ Gemination is more prevalent in the anterior maxillary region, whereas fusion is more commonly found in the anterior mandibular dentition.⁷ They can also be seen unilaterally or bilaterally in either the maxillary or mandibular dentition.⁵ Some studies have shown a proportion of permanent successor anomalies up to 50% following primary double

teeth. These include supernumerary teeth, congenitally missing teeth, and repeated double teeth formation.^{1,31,32} It is important to observe that supernumerary teeth are not uncommon and they appear in 0.3 to 3.8 percent of the population.^{33,34} Therefore, cases with primary double teeth necessitate careful examination as they may be associated with anomalies in the succeeding permanent dentition which require proper treatment planning because treatment of these anomalies is clinically demanding.

Literature review has shown a number of studies for the prevalence of double teeth in primary dentition¹²⁻²⁵, but no such study has been conducted on Turkish population. This is the first study which describes the prevalence of double teeth in primary dentition of Turkish population. It will provide more information about the susceptibility of different teeth to these anomalies and will enable the practitioners to pay close attention to these teeth during clinical and radiographic examinations.

METHODOLOGY

It was a retrospective study conducted by retrieving data from the dental records of 4619 patients who attended the Dental Faculty, Erciyes University (Kayseri, Turkey) from 2005-2010. 2416 were not associated with complex syndromes. Data obtained from the dental records included, age and gender of the child, presence or absence of double teeth, position of double teeth and any anomalies in the permanent successors. In each case the gender of the child, the position of the double teeth and of other anomalies in either dentition were noted. Photographs and intra oral radiographs of patients with double teeth were used to classify the case in terms of the number and morphology of crowns and roots. Two experienced dentists examined all radiographs. They were reviewed and discussed by the panel in a negatoscope an a7x lens was used. The involved teeth were categorized by a method similar to the rule frequently applied in the differentiation between fusion and gemination. A tooth was diagnosed as geminated if its crown was enlarged with a normal root and the tooth number was normal. A tooth was diagnosed as fused if its crown and root were enlarged and the tooth number was less than one. Both fused and geminated teeth were counted as one double tooth.

TABLE 1: PREVIOUS STUDIES ABOUT DOUBLE TEETH IN PRIMARY DENTITION

	Study	Dentition	Year	Country	Sample	No of double teeth	Prevalence (%)
1	Tinn ¹²	Primary	1940	Great Britain	8,500	22	0.3
2	Menczer ¹³	Primary	1955	United States	2,209	3	0.1
3	Clayton ¹⁴	Primary	1956	United States	1,795	14	0.7
4	Grahnen ¹⁵	Primary	1961	Sweden	1,173	6	0.5
5	Moller ¹⁶	Primary	1963	Iceland	609	1	0.2
6	Curzon ¹⁷	Primary	1967	Canada (white)	776	8	0.9
7	Ravn ¹⁸	Primary	1971	Denmark	4,564	39	0.9
8	Holm ¹⁹	Primary	1974	Sweden	208	1	0.5
9	Jarvinen ²⁰	Primary	1980	Finland	1,141	8	0.7
10	Buenviaje ²¹	Primary	1984	United States	2,439	9	0.4
11	Magnusson ²²	Primary	1984	Iceland	572	4	0.7
12	Barac-Furtinovic V ²³	Primary	1991	Croatia	2,987	15	0.5
13	L Aguiló ²⁴	Primary	1999	Spain	6,000	53	0.8
14	Cheng RB ²⁵	Primary	2003	China	4,286	65	1.6

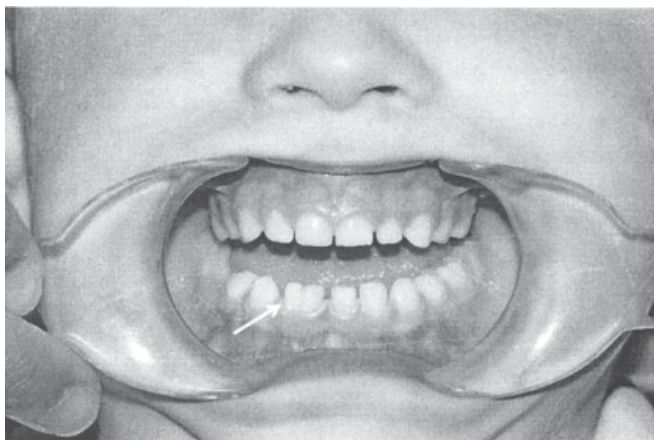


Fig 1a: Intraoral view of the fused primary mandibular right central and lateral incisor

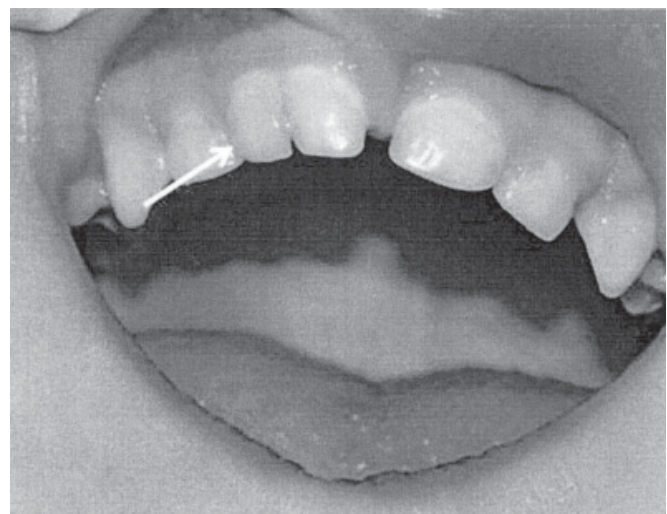


Fig 2a: Intraoral view of the maxillary primary double teeth

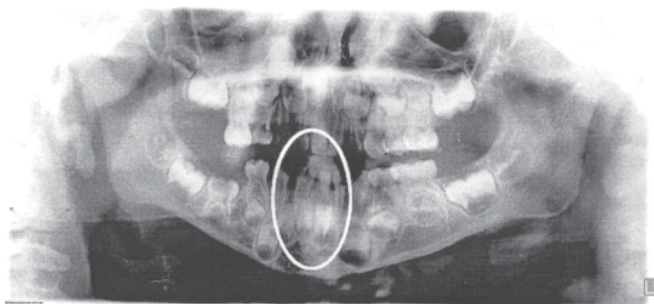


Fig 1b: Orthopantomograph showing presence of permanent mandibular incisors in relation to the double primary teeth

The occurrence of double primary teeth and their effects on the permanent dentition including normal teeth and hypodontia were also recorded. The person chi-square test was used to determine potential differences in the distribution of double teeth when stratified by gender.

RESULTS

The data obtained is shown in Table 2. The sample of 4,619 children examined showed a prevalence of 0.38% double teeth. Twenty two cases of double teeth

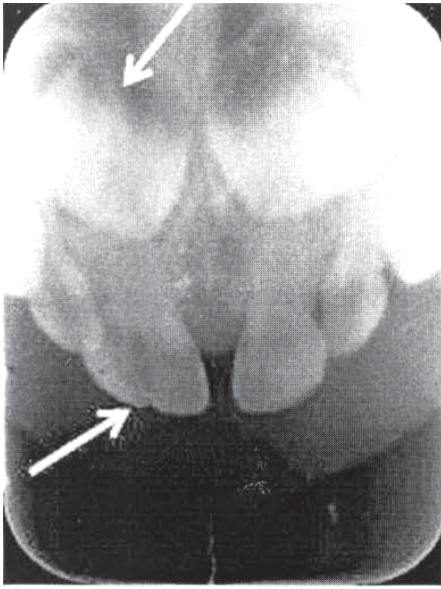


Fig 2b: Periapical radiograph displaying two distinct roots and root canals with presence of permanent maxillary right incisors

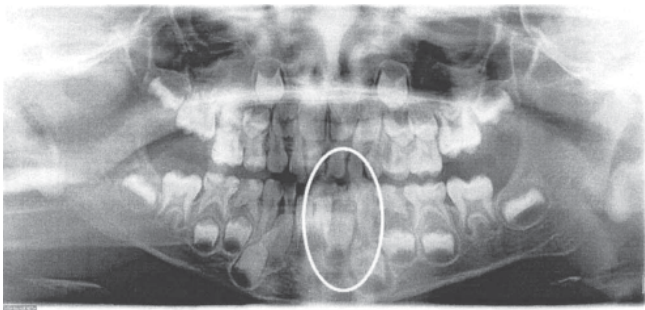


Fig 3: Orthopantomogram displaying the double teeth with presence of 32

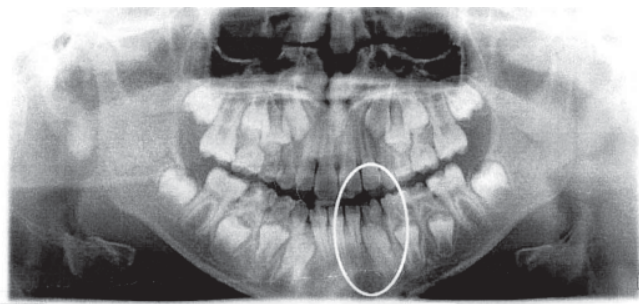


Fig 4: Orthopantomogram displaying congenitally absence of 32 in relation to the double teeth

were considered and they were found mostly mandibular lateral incisors and canines (45.4%). These were seen in 18 children (9 boys and 9 girls) in age range from 2 years 3 months to 12 years 5 months (mean age 7.3) (Table 3). The anomaly is equally present in boys and girls with a 1:1 male female ratio, however, the difference was not statistically significant ($p=1.000$). Fur-

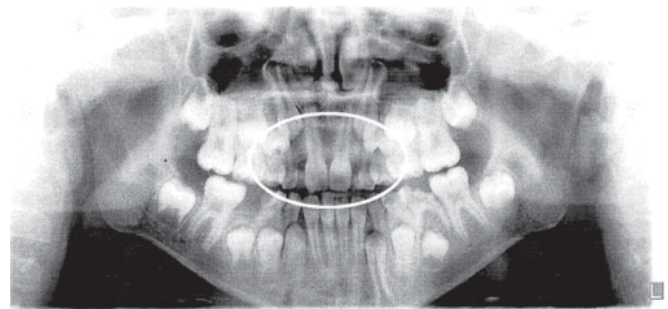


Fig 5: Bilaterally fused primary maxillary lateral incisors and canines. Note that congenital absence of permanent lateral incisors

thermore, in regard to the distribution in jaws the anomaly is more frequent unilaterally (81.9%) than bilaterally (18.1%).

The analysis of clinical and radiographic characteristics of the double teeth showed three morphological types of crowns: single, large and two fused crowns, and four types and roots: single, large, double conical and two fused roots. Bilateral occurrence of double teeth in either the maxilla or mandible was seen in 2 cases. Table 2 also shows the distribution of the double primary teeth and their effects on corresponding permanent successors. 81.8% of cases experienced further problems in the permanent successors. Hypodontia 77.2% was the most common problem in the permanent successors. Only four of the twenty two double teeth involving the mandibular lateral incisors and canines had a normal number of permanent successors, nine (40.9%) presented with missing permanent mandibular lateral incisors, only one malformed permanent mandibular right canine (4.6%) and two

TABLE 2: DOUBLE PRIMARY TEETH AMONG 4619 CHILDREN

	N	%
Double teeth	22	0.38(18*/4619)
Fusion	21	95.4
Gemination	1	4.6
Upper jaw	8	36.3
Lower jaw	14	63.6
Unilateral	18	81.9
Bilateral	4	18.1
Boys	9*	50
Girls	9*	50

N: no of double teeth

* : no of children with double teeth

mesiodences in a case. Only one double tooth involving the maxillary central and lateral incisors had a normal number or permanent successors.

DISCUSSION

Dental anomalies of number and forms may occur in the primary and permanent dentition, leading to orthodontic, including spacing or crowding of teeth, loss of arch length, esthetic problems increased caries risk, and deviation of the midline in preschool children.³¹ They may be associated with a syndrome or they can be found in non syndromic patients. Current data in the literature show that double teeth in primary dentition are observed in 0.1 1.6% with no sex predilection.^{7,35,36} In this study, the prevalence, of double teeth in the primary dentition of children was 0.38%. Due to this low prevalence, the importance of these anomalies tends to be underestimated.¹ The prevalence of bilateral double teeth in primary dentition was 0.08% in this study, which was higher than previous reports in Europeans (range 0.01% to 0.04%).⁷

The etiology of fusion is not exactly known. Some writers contend that fusion results when two tooth germs develop so close together that, as they come into contact and fuse before calcification. Other researchers believe that physical pressure or force generated during growth causes contact between adjacent tooth germs.²⁷ Other authors consider a viral infection during pregnancy and the use of thalidomide as possible causes of the anomaly.³⁷ Although the etiology is still not clear, there is strong evidence for genetic control of fused teeth as evidenced in family and twin studies.^{1,31,35} Fusion has also been reported with congenital anomalies like cleft lip.³⁸ It is also seen with S-linked congenital condition.³⁹ Some dental and non-dental abnormalities have been associated with double defects. These include: supernumerary teeth, hypodontia, peg-shaped permanent maxillary lateral incisors, dens in dente, nail disorders, syndactyly⁴⁰, successional conical, macrodontia and double permanent teeth.⁴¹ Brook et al⁴¹ reported that half of the primary double teeth have been followed by an anomaly in the permanent dentition and family histories of hypodontia or supernumerary teeth were found in some cases. Kolenc-Fuse⁴² reported that genetic linkage and molecular biology studies allowed the identification of mutation

responsible for some patterns of syndromic and nonsyndromic tooth agenesis.

Numerous studies have shown that double deciduous teeth have an influence on permanent successors, including hypodontia, repeated double teeth, supernumerary teeth, and peg-shaped teeth.^{1,31} The most common problem related to double teeth is hypodontia of the permanent dentition and it has been observed in 50% of affected subjects.⁴¹ In present study, the overall percentage of permanent tooth anomalies was 81.8% including hypodontia (77.2%) and malformed permanent teeth (4.6%). Double teeth involving a lateral incisor and canine appeared exclusively in the mandible.¹⁸ In this study, double primary teeth were found mostly in the mandibular lateral incisors and canines (45.45%), and this is in agreement with previous studies. Only one geminated maxillary central incisor was found in this study. Consecutive radiograph of developing dentition in this case showed normal permanent dentition without any missing permanent successor.

In double teeth involving the mandibular lateral incisors and canines, hypodontia of permanent successors is most common. In contrast, no effect on the permanent successors was observed when the double teeth occurred between the primary mandibular central and lateral incisors, and this result was also in agreement with previous studies.^{1,31} Aguilo et al²⁴ reported that double teeth were frequently unilateral, involving two adjacent teeth, and no difference was found in the proportion of double teeth in either the mandible or maxilla, or on the right or left side. White et al²⁷ reported that when a deciduous canine and lateral incisor fuses, the corresponding permanent lateral incisor may be absent. Gellin³² reported that the effected permanent successor was up to 100% when double primary teeth involved the lateral incisors and cuspids. In this study some cases presented with primary double teeth were associated with the presence (figure 1b, 2b, 3) / absence (figures 4, 5) of the permanent incisors.

Several clinical and radiographic benchmark are used to distinguish fusion from gemination. Fusion is the incomplete attempt of two tooth buds to fuse into one, however gemination is the incomplete attempt of one tooth bud to divide into two.³¹ Clinically, the crowns of the teeth appear to be melded tighter, with a small groove between the mesial and distal sections⁴³, but on

the fused teeth radiographs, there will be two distinct pulp chambers and if the fused tooth is counted as one unit, there will be one less tooth in the arch than normal. In cases of gemination, radiographically there is only one pulp chambers and the anomalous tooth is counted as one unit, the number of teeth in the arch will be normal. Gemination may be differentiated from fusion by the increased number of teeth, except in unusual cases in which the fusion is between a supernumerary tooth and, a normal tooth. Macrodontia is a condition in which any tooth or teeth appear larger than normal for that particular type of tooth. True macrodontia that involves the entire dentition is rare. It is more common that there is an enlargement of a single tooth due to a disturbance of morpho-differentiation.⁴⁴ Since double teeth are obviously wider than the circumjacent teeth, esthetics may be a concern. When normal teeth fuse, excess dental space can result. This can result in diastema formation. When fusion occurs in the primary dentition, some of the permanent incisors often are not present. These problems require both cosmetic and orthodontic consideration.⁴⁵ The presence of fissures or grooves at the union between fused teeth predisposes it to caries and periodontal disease.⁴⁶ In a preventive concern, the buccal and lingual vertical grooves of double primary teeth may be pronounced and difficult to clean, and are highly susceptible to caries.⁴⁷ The placement of fissure sealants or composite restorations in these grooves should decrease the caries risk.⁴⁸ The presence of double deciduous tooth can also cause delayed resorption of root due to greater root mass and increased area of root surface relative to the size of the permanent successor crown.⁴⁹

Treatment of a fused tooth will depend on the clinical situation. There are different treatment approaches of cases with double teeth.⁵⁰ If the affected teeth are primary, they may be retained as they are. If the clinician plans extraction, it is important to determine first whether the corresponding teeth are present.²⁷ The patients' expectations and degree of compliance must also be accurately assessed when determining suitable management. If the fused tooth is free from caries, it may require no particular treatment. Universal preventive advice should be given to the parent and the child¹⁰ and if caries already exist, a restoration should be made.⁵¹ When dividing double teeth, the complicated dental canal system should be

evaluated cautiously.⁴⁰ If there is pulpal involvement, endodontic treatment should be carried out in the same way as for a multirrooted tooth.⁵¹ Orthodontic management should be considered to ensure functional occlusion and advance esthetics.⁴⁰

In conclusion, according to the result, of the present study once double teeth have been diagnosed, careful monitoring is required, since problems with exfoliation can occur, along with caries formation in the groove of the incompletely formed double teeth. Although primary double teeth themselves may be regarded as harmless anomalies, their presence can cause some space problems, occlusal disturbance, and delayed eruption of the permanent successors.

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