Acta Medica Alanya

RESEARCH ARTICLE

ARAŞTIRMA

Acta Medica Alanya

2018;2(3): 199-205

DOI: 10.30565/medalanya.432277

Timing and sequence of eruption of primary teeth in southern Turkish children

Türkiye'nin güneyinde yaşayan çocuklarda süt dişlerinin erüpsiyon zamanı ve sekansı

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ABSTRACT

Aim: The aim of the present study was to evaluating the sequence and timing of primary teeth eruption, as well as gender differences, in children that living in south of Turkey.

Patients and Methods: This study was conducted on 584 healthy children under 36 months. A tooth was considered to be erupted when any part of it had pierced through the gingiva and had seen, and touched. The Primary Universal Numbering System was used for dental notation.

Results: In this study, there were 318 boys and 266 girls with mean age of the children were 13.14 months. The first primary tooth was erupted, on average, at 208 days and last primary tooth at 741 days. The tooth erupting in order was central incisor, lateral incisor, first molar, canine, and second molar.

Conclusions: Timing and sequence of primary teeth eruption in southern Turkish children were found similar results which previously reported studies that living children in the other geographical area. Between gender and time of the primary teeth eruption was found no significant difference.

Key words: Primary teeth, Teeth eruption, Sequence, Gender, Turkish children

ÖZ

Amaç: Bu çalışmanın amacı, Türkiye'nin güneyinde yaşayan çocuklarda süt dişlerinin çıkma zamanı ve sekansını cinsiyet farkını da göz önüne alarak değerlendirmek.

Hastalar ve Yöntem: Bu çalışma 36 ayın altındaki sağlıklı 584 çocukta yapıldı. Dişin bir parçası gingivada görüldüğünde veya palpe edildiğinde erüpsiyon olarak değerlendirildi. Diş sıralaması için "The Primary Universal Numbering System" kullanıldı.

Bulgular: Çalışmada, 318 erkek, 266 kız çocuk vardı ve yaş ortalamaları 13.14 ay idi. İlk süt dişi erüpsiyonu ortalama 208 günde ve son süt dişi erüpsiyonu ortalama 741 günde görüldü. Erüpsiyon sıralaması santral kesici, lateral kesici, birinci molar, kanin ve ikinci molar idi.

Sonuç: Türkiye'nin güneyinde yaşayan çocuklarda süt dişlerinin erüpsiyon zamanı ve sekansı konusunda elde edilen sonuçlar, diğer coğrafik bölgelerde yaşayan çocuklarda yapılan çalışma sonuçlarına benzer olarak bulundu. Süt dişlerinin erüpsiyon zamanı ile cinsiyet arasında anlamlı bir farklılık bulunamamıştır.

Anahtar Sözcükler: Süt dişleri, Erüpsiyon, Sekans, Cinsiyet, Türk çocukları

Received Date: 08.06.2018/ Accepted Date: 30.09.2018 / Published Date : 13.11.2018

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Teething is a normal part of child growth and development. Totally twenty primary teeth are found in children. There are ten teeth at upper (maxilla) and lower (mandible) jaw. These are two central incisors, two lateral incisors, two canines, two first molars and two second molars at maxilla and mandible in each [1].

Eruption is defined as the movement of the teeth from the alveolar bone into the oral cavity [2, 3]. All babies have twenty primary teeth which are ready to erupt at birth. Each tooth begins a continuous movement toward the oral cavity after second month [1]. Eruption time of primary teeth widely varies from one person to the next. The factors that related to the eruption of primary teeth are not fully understood. The conducted studies about this issue show that primary teeth eruption are influenced by multiple genetic, gender, metabolic, endocrine and environmental factors [4-6]. Primary teeth eruption is also related that gestational age and severity of neonatal illness, postnatal nutrition, as well as the degree of prematurity [7].

Teething usually begins between 4 and 10 months [4]. However, every baby is different, and the start and duration of teething process can vary greatly between individuals. Moreover, regional differences can be seen within the same country [7].

Population-specific standards of primary teeth eruption are valuable for the detection of temporal disturbances or anomalies affecting tooth development during early childhood. Moreover, population-specific standards of primary teeth eruption should be available for reliable dental age estimation for forensic investigations and for anthropological applications [2].

The time and sequence of primary teeth eruption has been studied by several researchers in many parts of world [2, 8]. Although the standards of tooth eruption for permanent teeth in Turkish children have been recently made available, there are not enough studies for providing standards on primary teeth eruption [9, 10]. The purpose of this study is to determine the time and sequence of primary teeth eruption, as well as gender differences, in healthy children that live in south of Turkey, and to compare the data with reports from the English literature.

PATIENTS AND METHODS

This study was performed in our pediatric clinic between September 2013 and September 2015. Healthy children under 36 months were participated the study. Premature babies, syndromic children, children with chronic diseases (e.g., asthma, hypertension, diabetes mellitus, or other cardiovascular, endocrine, metabolic, neurological or inflammatory diseases), and children with history of prolonged drug use were excluded, because of the possible influence on tooth eruption. In pediatric clinics, dental examination was carried out under artificial light and a tongue depressor. During intraoral examination, the tooth eruption was defined as having seen if any tooth surface had pierced the alveolar mucosa. If it was first noticed by the physician or parents knew the exact day of eruption, then a form was filled. Age (in days), gender, code of erupting tooth, total teeth number were noted. A month is accepted as 30 days. Nearest month is accepted when age in days calculated as months of age.

The Primary Universal Numbering System that adopted by the American Dental Association was used for dental notation (Figure 1) [11]. Beginning at the second molar on the upper right, the teeth in the maxillary arch are assigned letters A – J. Then continuing with the mandibular left second molar and around to the mandibular right second molar, the teeth are assigned letters K – T. The local ethics committee approved for this study. Written informed consent was taken from the legal guardians of the children who participated in this study.

Statistical Analyses

The IBM SPSS Version 21.0 (IBM Corp. Armonk, NY; USA) and 'Microsoft Office Excel' were used for all statistical analyses. For the comparison of data, related with eruption of the first deciduous tooth, the non-parametric Mann-Whitney U test were used for two independent samples, and the Kruskal Wallis test was used for the comparison of more than two independent samples. For discrete variables, Chi- Square and Fisher's exact test were used. For all statistical comparisons, the significance was set as $p<0.05$. Data was given as mean value ±standard deviation (minimum and maximum) or median (minimum and maximum) if possible. According to mean ±2 standard deviations, tooth eruption is accepted as early or delayed.

RESULTS

A total 584 children were examined in this study. There were 318 boys (54.5%) and 266 girls (45.5%). Mean age of the children was 13.14 ±5.63 (4-36) months

old. Descriptive statistics for age of each primary tooth eruption were given in Table I. Median day of eruption time for each tooth was also given at Figure 2. Tooth eruption started at 7 (4-13) months, twenty teeth completed eruption at 25 (14-28) months.

Right mandibular central incisor (P) was the first tooth erupted at median of 208 (110-383) days. Left mandibular central incisor (O) erupted at 212 (128-368) days which was the second tooth erupted. At last, the eruption of left maxillar second molar tooth (J) was completed at 741 (432-840) days.

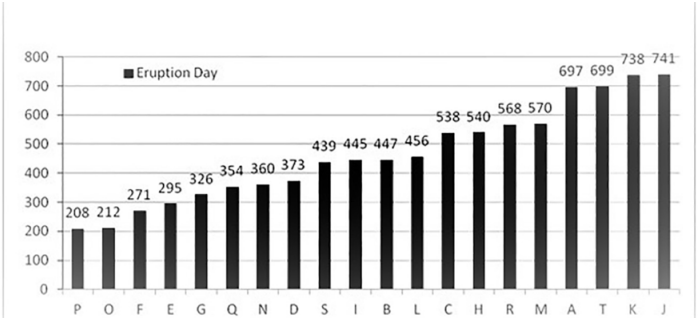

Figure 1: Median day of eruption time for each tooth

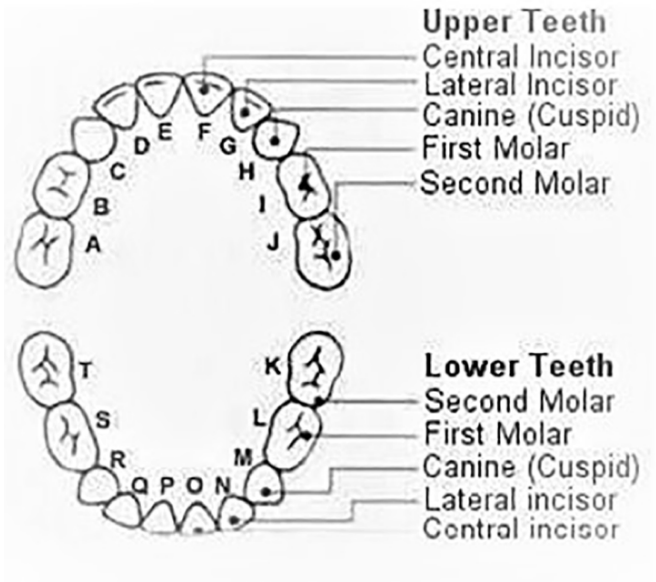

Figure 2: The Primary Universal Numbering System for dental notation.

The sequence of teeth eruption was central incisors, lateral incisors, first molars, canines and second molars. Mandibular teeth erupted earlier than maxillary teeth except left lateral incisor (G), left first molar (I), right canine (C), left canine (H), second molar (A).

At lower jaw, right teeth (P, Q, R, S, T) erupted earlier than left side (O, N, M, L, K). Right maxillary second molar (A) and canine (C) erupted earlier than left ones.

First teeth eruption was counted at 51 (8.7% of all children) babies. Left mandibular central incisor (O) erupted firstly at 56.9% of them, right mandibular central incisor (P) erupted at 31.4% of first tooth eruption.

Descriptive statistics for age of eruption of each primary tooth among gender were given in Table II. There was no significant difference for age of eruption of each tooth among gender categories ($p > 0.05$).

DISCUSSION

The eruption of primary teeth usually begins by 4-10 months after birth. Further, it continues at a rate of approximately one new tooth for each month, and the 20 deciduous teeth are almost completed by 30 months age [6]. One per cent of infants acquire first tooth before the age of 4 months, whereas 1% has not had their first tooth erupt by 12 months of age [4].

Normal eruption of deciduous teeth into oral cavity occurs over a broad chronological age [4, 12]. Tooth eruption is influenced by many factors. Some are individual factors such as nutritional and endocrinal factors, and some are demographic. Studies have shown that individuals from different ethnic and racial group show variation in eruption pattern and timing of individual teeth [13]. Folayan et al. [14] were compared their results to the study's results of different countries, and they found that support the possibility for racial and genetic variability in the timing of eruption.

The time of primary teeth eruption is highly variable between and within population; genetic and environmental factors are thought to be important [1, 6]. Delayed eruption may indicate systemic or nutritional disturbances. A positive correlation between the number of erupted teeth and birth weight and length has been reported [7]. In the present study, we did not take premature babies owing to this reason.

Torres et al. [15] investigated primary tooth eruption in 1250 healthy Spanish children, they found that the first tooth to erupt was the lower right central incisor at 10.96 months, and the last was the upper left second molar at 33.24 months. Woodroffe et al. [8] found in Australian twins that the first teeth in the primary dentition to eruption were generally the mandibular

Table I. Descriptive statistics for time of eruption of each primary tooth

Tooth Code	Tooth	Number of Patients	Median Eruption Time (day)	Minimum-Maximum	Mean Eruption Time (day)	Mean ± 2 Standard Deviation
P	Central Incisor	67	208	110-383	212,81	88-336
0	Central Incisor	64	212	128-368	225,70	106-346
F	Central Incisor	41	271	164-381	272.32	150-395
E	Central Incisor	40	295	172-391	295.78	176-416
G	Lateral Incisor	36	326	177-478	338.39	171-505
Q	Lateral Incisor	26	354	173-531	355,62	203-508
N	Lateral Incisor	24	360	236-472	352,33	209-496
D	Lateral Incisor	30	373	154-482	350.07	181-519
S	First Molar	14	439	365-619	453,29	301-605
I	First Molar	39	445	330-840	460.10	262-659
B	First Molar	37	447	330-794	471.35	255-687
L	First Molar	24	456	340-735	491,04	254-728
C	Canine	22	538	324-835	545.59	305-787
H	Canine	48	540	290-835	538.17	307-769
R	Canine	10	568	500-742	592,30	415-769
M	Canine	19	570	374-716	581,63	391-773
A	Second Molar	8	697	367-845	686.50	386-988
T	Second Molar	9	699	525-915	709,22	507-911
K	Second Molar	17	738	554-820	710,82	561-862
J	Second Molar	9	741	432-840	659,56	341-979

central incisors at, on average, approximately 8.6 to 8.7 months, with the last primary tooth to erupt being the maxillary second molars at approximately 27.7 to 27.9 months. Khalifa et al. [7] found that the mean eruption time of the first primary tooth was 7.97 months in Egyptian children.

Rao and Rao [13] investigated primary teeth eruption in Indian children, and their results are later than other countries that the mandibular central incisor was the first primary tooth to erupt at the age of 13.5 months and the last tooth to erupt into the oral cavity was the maxillary second molar at 36 months.

In this study, we found mean eruption time of the first tooth as 208 days. The minimum eruption time of primary teeth was 110 days and the maximum time was 383 days. Also, we found that the last primary tooth to erupt was maxillary second molars at 741 days. These results were similar to the study results of other Turkish children. Kaymaz et al. [12] found that the mean first tooth eruption time was 6.86 months in Turkish children. Baykan et al. [6] found that the mean first tooth eruption time of the infants was 7.4 months, with a range of 3-17 months.

Considering the gender factors, the time of primary tooth eruption in males and females is still poorly understood. There are many studies that boys showed relatively rapid progress in process of primer teeth eruption. However, there is no definite consensus on this issue. Sex appears to play a significant role in the eruption of teeth in Saudi Arabian children with boys erupting teeth earlier in both jaws [16]. Like this finding, the study of Choi and Yang [17] in 2001 on Korean infants showed that the primary teeth erupt of boys earlier than in those of girls. Shuper et al. [18] found that there was no statistically significant difference the variances by sex and ethnic origin in Israeli children. Also, Folayan et al. [14] found that there was no significant sex difference in Nigerian children. Pavicin et al. [3] found in their study that the timing of primary for the first tooth mean 7.55 months and there was no significant difference in timing of first primary tooth between males and females. Rao et al. [13] found that there was no significant difference between the eruption timing in boys and girls for both maxilla and mandible. Baykan et al. [6] found in Turkish children that teeth eruption time was found similar in both genders.

Soliman et al. [19] found in Egyptian children that the mandibular central incisors were earliest teeth eruption at a mean of 8.0 months in boys and 7.9 months in girls. Torres et al. [15] found that the first molars and maxillary lateral incisors erupted earlier in girls than in boys, with no statistically significant chronological

Table II. Descriptive statistics for time of eruption of each primary tooth among gender.

Tooth Code	Gender	Number of Patients	Median Eruption Time (day)	Minimum-Maximum	Mean Eruption Time (day)	Mean ± 2 Standard Deviation	P value
A	Boy	4	713,50	367-845	659,75	232-1088	0.999
	Girl	4	696,50	650-810	713,25	569-857	
B	Boy	17	462,00	353-794	487,59	248-728	0.390
	Girl	20	430,50	330-745	457,55	262-653	
C	Boy	14	537,50	324-730	533,71	286-782	0.664
	Girl	8	538,50	465-835	566,38	328-804	
D	Boy	19	320,00	154-482	332,32	151-514	0.145
	Girl	11	390,00	225-454	380,73	250-512	
E	Boy	17	274,00	172-385	276,06	148-404	0.071
	GİRL	23	307,00	222-391	310,35	204-417	
F	Boy	22	263,00	164-381	262,27	124-401	0.250
	Girl	19	281,00	210-377	283,95	185-383	
G	Boy	19	303,00	177-478	320,37	152-488	0.232
	Girl	17	353,00	225-465	358,53	197-520	
H	Boy	27	535,00	370-780	534,59	341-728	0.909
	Girl	21	540,00	290-835	542,76	267-819	
I	Boy	23	450,00	330-840	471,22	222-720	0.767
	Girl	16	444,50	361-534	444,13	360-528	
J	Boy	4	700,00	443-790	658,25	348-968	0.999
	Girl	5	741,00	432-840	660,60	298-1024	
K	Boy	8	723,50	554-820	708,38	537-880	0.963
	Girl	9	738,00	581-791	713,00	572-854	
L	Boy	9	421,00	340-608	453,78	261-647	0.290
	Girl	15	475,00	355-735	513,40	257-770	
M	Boy	12	552,00	470-716	577,33	410-745	0.650
	Girl	7	570,00	374-713	589,00	348-830	
N	Boy	12	345,00	236-472	344,08	176-512	0.630
	Girl	12	366,50	238-433	360,58	242-479	
O	Boy	39	210,00	128-358	223,62	100-347	0.635
	Girl	25	220,00	150-368	228,96	113-345	
P	Boy	37	195,00	110-338	202,05	97-307	0.212
	Girl	30	215,00	123-383	226,07	84-368	
Q	Boy	16	346,50	280-531	366,00	205-527	0.856
	Girl	10	354,50	173-408	339,00	198-480	
R	Boy	6	534,50	500-742	576,83	384-770	0.610
	Girl	4	617,50	514-713	615,50	450-781	
S	Boy	9	435,00	380-540	433,67	329-538	0.438
	Girl	5	473,00	365-619	488,60	278-699	
T	Boy	4	701,50	676-720	699,75	663-736	0.999
		5	693,00	525-915	716,80	434-999	

differences.

Sahin et al. [4] and Kaymaz et al. [12] reported that they observed no gender effect on the timing of teething in Turkish children. In our study, there was no significant difference between gender and time of eruption of the primary tooth.

In most of the studied cases, teething started in mandibular incisor (98%) with less present (2%) in maxillary one. The most of authors and literatures are in agreement with which stated that the mandibular incisors erupt before maxillary incisors [7]. Al-Batayney et al. [2] researched that timing and sequence of emergence of primary teeth in 1988 Jordanian children, they found that the earliest teeth to appear in the mouth were the mandibular central incisors at 8.2 months post partum followed by the maxillary central incisor at 10.5 months. The following teeth in order; maxillary lateral incisor, mandibular lateral incisor, maxillary first molar, mandibular second molar, maxillary canine, mandibular canine, and the last eruption tooth was maxillary second molars at approximately 27.5 months. Earlier studies have reported a generally consistent finding of central incisor, lateral incisor, first molar, canine, and second molar, as the most common erupted sequence [8]. In our study, sequence of primary teeth eruption was mandibular central incisor, maxillary central incisor, maxillary lateral incisor, mandibular lateral incisor, mandibular first molar, maxillary first molar, maxillary canine, mandibular canine, maxillary second molar, and mandibular second molar.

In Turkish study, the first tooth erupted was the lower central incisor in the 86.0% of infants and upper central incisor in 13.1% of infants [6]. In our study, the first tooth was mandibular central incisor in most of the children as in the literature. Baykan et al. [6] found that no statistically significant difference was found between the eruption time and sequence of the primary teeth.

Alanya is a city where the coast of the Mediterranean Sea in south of Turkey. Its climate is hotter than a lot of Turkey's cities [20]. We thought that the first tooth eruption time might be early in children whose lives high temperature. Our study' results did not differ significantly from the results of doing Turkish children that live in west and middle of Turkey [12].

Study Limitation: This is a cross sectional study, it is a limitation. Data collection with periodic intervals is a problem for longitudinal studies. Exact date can be forgotten easily from family members. Parenteral recording of babies are also unreliable. Also, vitamin D level and biochemical test results of babies is unknown. We accepted them normally due to the fact that there is no healthy problem.

Conclusion: Tooth eruption is affected by various factors. In this study, we searched that time and sequence of primar tooth eruption in children who living hot climate. Our results were similar other studies. There was no significant difference between gender and time of eruption of the primary tooth. We could not demonstrate any relation of the sequence of tooth eruption with gender.

Declaration of conflicting interests: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding: The authors received no financial support for the research and/or authorship of this article

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How to cite this article/Bu makaleye atıf için:
Çoban B, Kansu L, Dolgun A. Timing and sequence of eruption of primary teeth in southern Turkish children. Acta Med. Alanya 2018;2(3):199-205. doi: 10.30565/medalanya.432277