


Sexual dimorphism of primary dentition in Spanish children

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ABSTRACT

Aim: To analyse differences in the eruption of primary teeth between both sexes.

Materials and methods: A cross-sectional study was performed in a sample of 1250 children aged between 3 and 42 months. The clinical emergence of teeth was taken to estimate average ages for primary teeth eruption. The t-test was used to analyse gender and arch differences.

Results: Eruption of primary teeth began at the same time in girls as in boys; although the eruptive process was longer in girls. It was observed that almost all deciduous teeth emerged earlier in boys, except for the first molar (upper and lower) and the maxillary central incisors. The differences were statistically significant for almost all the primary teeth except for the central incisors, both upper and lower.

Conclusions: By comparing the timing of the eruption of primary teeth in both sexes, it was found that eruption of almost all primary teeth took place earlier in boys than in girls and that the eruption process was shorter for boys than for girls. Most of the deciduous teeth erupted earlier in the right side in both sexes. No differences were found in the sequence of eruption of primary teeth between genders.

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Introduction

Eruption of the primary dentition is a long process that is closely related to the growth and development of the child, and is defined as the movement of the tooth from its development position within the alveolar process to a functional situation in the oral cavity [1].

In the first half of the twentieth century, Logan and Kronfeld present the first chronological table of the development of the human dentition obtained from the study of necropic material. From now on and during the second half of the twentieth century, many researchers have tried to verify the differences or analogies between different populations and to establish if these are due to group characteristics or environmental influences [2,3].

The dental system is an integral part of the human body. Its growth and development should be studied in parallel with other physiological indicators of maturity such as bone age, menarche and weight [4–9]. One of the most commonly used criteria for evaluating dental maturity is the study of the timing and sequence of dental eruption.

The literature includes studies that explain the influence of gender on human development. Starting in the uterus, body size and physical changes, periods of growth, hormonal and psychological development occur differently in boys and girls [9–11].

Dental eruption is known to be influenced by different hormones, and it has been suggested that the growth hormone plays an important role in the metabolic activity of the

periodontal ligament [12,13]. Hormonal influence on the development of dentition has been studied in relation to this variable. Testosterone levels in men vary throughout the different stages of growth. High levels of testosterone have been found from the tenth to the twentieth week of intra-uterine life, and in the first months of life and adolescence. This coincides with periods in which tooth development is more advanced in boys than in girls [14].

Following the same line of study, many authors have related weight and height at birth (different by gender) with the number of teeth erupted at a certain age, finding an association between both factors [9,15–17].

The ethnic factor is determinant in the eruption of the teeth, affecting both dentitions.

Primary dentition has been the subject of many studies in different populations, but few of them cover the Spanish population, and even fewer focus on the influence of gender on this aspect of child development.

Based on the above, the aim of our study was to analyse gender differences in the timing and sequence of primary teeth eruption in a large sample of children in the Region of Madrid, in order to contribute to the updating of the current literature.

Materials and methods

This cross-sectional study analysed 1464 subjects, 742 boys and 722 girls. All were aged between 3 and 42 months and

were examined in various nurseries in the Region of Madrid, chosen at random. Once informed the directors of the nurseries who voluntarily wanted to participate in the study, the informed consent signed by parents/guardians was obtained for the review of the children.

To be included in the study, all subjects had to meet the following criteria: under 42 months of age, full term, Spanish origin (white European), healthy, with informed consent to participate in the study signed by the parents/guardians. We excluded from the study any individuals with the following:

- Birth defects affecting the orofacial area (cleft palate, cleft lip).
- Presence of syndromes or diseases associated with alterations in tooth eruption.
- Preterm children and/or low birth weight.
- Family history of tooth agenesis.
- Avulsion and/or extraction of teeth.

Given the criteria for inclusion and exclusion, 214 participants were excluded for the following reasons: 123 were not of Spanish origin, four were premature, five had agenesis of one or more primary teeth, nine had been diagnosed with syndromes or pathologies affecting tooth eruption, three had a history of dental avulsion, two were conceived through artificial insemination techniques, whose background (unknown) could lead to biases in the study, and for 68 consent was not obtained from parents.

Consequently, the study sample consisted of 1250 subjects, 623 girls and 627 boys, aged between 3 and 42 months.

The data collection was performed in the nurseries. Scanning was carried out under good lighting, with the help of a mirror, by inspection and palpation. A tooth was considered erupted when any part of its crown had penetrated the mucosa and was visible in the oral cavity. The reviews were conducted by two examiners, on whom concordance tests were performed after an initial review of the first 350 children, obtaining a Kappa concordance index of 1 (100% agreement).

In a table specifically designed for data collection, the subjects' initials, sex, date of birth and review, and the teeth present in the oral cavity were noted.

To facilitate the analysis of the data obtained, all data were included in a table of Microsoft Office Excel, version 2010, calculating the chronological age of each of the subjects, expressed in months, ordering them from lowest to highest.

In this way, it was possible to establish the age intervals of eruption of each of the deciduous teeth, being the age limits of this interval:

- Initial value: the first age at which the tooth appears in the sample.
- Final value: age from which the presence of the tooth is constant.

With these data the mean age of emergence and the standard deviations of each of the temporal teeth were obtained, from which the statistical significance was calculated by means of the Student *t*-test for independent samples, with a confidence interval of 95%, based on the IBM SPSS Statistics.

Results

Timing of eruption in males

In boys, the emergence of deciduous teeth began near the first birthday with eruption of the lower right central incisor. At 16 months, the lower central incisors and upper incisors (both central and lateral) were present. Subsequently, the first molars erupted, upper and lower, at around 22 months old, followed by the lower lateral incisors at approximately the second birthday and the canines after 24 months. The emergence of deciduous dentition in boys ended with the appearance of the second molar after the age of two and a half (Table 1).

The eruption of primary teeth in boys lasted 21.96 months. It began with the eruption of the lower right central incisor at 10.99 ± 1.88 months, and ended with the emergence of the upper left second molar at 32.95 ± 4.59 months.

Regarding eruption symmetry between the two sides in boys, it was observed that the deciduous teeth on the right side erupted first, except for the maxillary lateral incisor, lower first molar and canines (upper and lower) which erupted first on the left side. These differences were statistically significant for the upper canine (which erupted 1.15 months earlier on the left side) and the lower central and lateral incisors (which erupted earlier on the right side).

Regarding the timing of eruption between both arches in boys, we noted that the central incisors and second molars erupted earlier in the mandible, while the lateral incisors and first molars emerged earlier in the maxilla. In the case of canines, no differences were observed between the two arches. The greatest time difference was observed between the lateral incisors, which erupted more than eight months earlier in the maxilla than in the mandible, a statistically significant difference (Table 2).

The sequence of eruption of primary teeth for each arch separately in boys was as follows:

- Mandible: central incisor, lateral incisor, first molar, canine and second molar.
- Maxilla: central incisor, lateral incisor, canine and second molar.

We found the following eruption sequence for all the primary teeth in boys: mandibular central incisor, upper central incisor, upper lateral incisor, maxillary first molar, mandibular

Table 1. Comparative study between sides of the average ages of eruption (in months) of the deciduous teeth in males.

	Right		Left		t-Test (<i>p</i> value)
	Mean	SD	Mean	SD	
Maxilla					
Central incisor	14.89	2.82	14.97	2.76	.82
Lateral incisor	15.23	2.70	15.21	2.74	.94
Canine	25.85	4.38	24.70	3.97	.00*
First molar	21.80	3.76	21.82	3.72	.93
Second molar	32.49	4.38	32.95	4.59	.23
Mandible					
Central incisor	10.99	1.88	12.22	2.59	.00*
Lateral incisor	23.32	5.24	24.13	5.65	.04*
Canine	25.37	3.80	25.28	3.86	.80
First molar	22.01	3.65	21.98	3.58	.91
Second molar	32.23	4.40	32.32	4.34	.81

*Statistically significant value.

Table 2. Comparative analysis of the average ages of eruption between both arches in males.

	Maxilla		Mandible		t-Test (<i>p</i> value)
	Mean	SD	Mean	SD	
Central incisor	14.93	2.79	11.70	2.39	.00*
Lateral incisor	15.21	2.72	23.76	5.46	.00*
Canine	25.31	4.23	25.31	3.82	.70
First molar	21.80	3.73	22.00	3.60	.35
Second molar	32.73	4.50	32.26	4.36	.00*

*Statistically significant value.

first molar, mandibular lateral incisor, maxillary canine, mandibular canine, mandibular second molar and maxillary second molar.

Timing of eruption in females

In girls, the eruption of primary teeth began with the appearance of the lower right central incisor near the first birthday. As in males, the lower central incisors and upper incisors (central and lateral) erupted at 16 months. From 21 to 22 months, the first molars erupted, followed by the lower lateral incisors at the age of two. About two months later, the upper and lower canines emerged, and the eruption of primary teeth ended with the appearance of the second molars after the age of two and a half (Table 3).

The eruption of primary teeth in females lasted 22.63 months. It began with the eruption of the lower right central incisor at 10.92 ± 1.90 months, and ended with the emergence of the upper left second molar at 33.55 ± 4.45 months.

Regarding eruption symmetry between the two sides in females, it was observed that the deciduous teeth on the right side erupted first, except for the maxillary lateral incisor, lower first molars and canines (upper and lower) which erupted first on the left side. These differences were statistically significant for the upper canine (which erupted 1.23 months earlier on the left side) and the lower central and lateral incisors (which erupted earlier on the right side).

Regarding the timing of eruption between both arches in females, the central incisors and second molars erupted first in the mandible, while the lateral incisors, canines and first molars emerged first in the maxilla. The greatest time difference was observed between the lateral incisors, which erupted more than eight months earlier in the maxilla than in the mandible. The differences were statistically significant in the case of the central and lateral incisors and second molars (Table 4).

The order of appearance of primary teeth for each arch separately in girls was found to be as follows:

- Mandible: central incisor, first molar, lateral incisor, canine and second molar.
- Maxilla: central incisor, lateral incisor, first molar, canine and second molar.

We found the following sequence for all the primary teeth in girls: mandibular central incisor, upper central incisor, upper lateral incisor, maxillary first molar, mandibular first molar, mandibular lateral incisor, maxillary canine, mandibular canine, mandibular second molar and maxillary second molar.

Table 3. Comparative study between sides of the average ages of eruption (in months) of the deciduous teeth in females.

	Right		Left		t-Test (<i>p</i> value)
	Mean	SD	Mean	SD	
Maxilla					
Central incisor	14.88	2.96	14.91	2.91	.94
Lateral incisor	15.32	2.79	15.28	2.82	.94
Canine	26.50	4.44	25.27	4.00	.00*
1st molar	21.28	3.98	21.34	3.92	.87
2nd molar	33.19	4.31	33.55	4.45	.37
Mandible					
Central incisor	10.92	1.90	12.36	2.48	.00*
Lateral incisor	23.24	5.33	24.26	5.73	.01*
Canine	26.14	3.80	26.06	3.81	.82
First molar	21.49	3.86	21.45	3.81	.90
Second molar	32.59	4.60	32.67	4.36	.86

*Statistically significant value.

Table 4. Comparative analysis of the average ages of eruption between both arches in females.

	Maxilla		Mandible		t-Test (<i>p</i> value)
	Mean	SD	Mean	SD	
Central incisor	14.88	2.94	11.80	2.39	.00*
Lateral incisor	15.30	2.79	23.76	5.56	.00*
Canine	25.95	4.28	26.10	3.80	.75
First molar	21.31	3.96	21.47	3.82	.55
Second molar	33.37	4.37	32.64	4.46	.00*

*Statistically significant value.

Comparative analysis between genders

For the timing of primary teeth eruption, we observed earlier emergence of almost all deciduous teeth in boys, except for the first molars, upper and lower, and the maxillary central incisors which emerged earlier in girls. The largest difference in timing was found in mandibular canines, which erupted at 25.31 months in boys, and at 26.10 months in girls. The differences were statistically significant for almost all deciduous teeth, except for both the upper and lower central incisors (Table 5).

For other characteristics of the eruption process, while the start of eruption of primary teeth began at the same time in girls (10.92 months) as in boys (10.99 months), its duration was longer in girls than in boys (22.63 months in girls versus 21.96 months in boys). No gender differences were found in the sequence of eruption of deciduous dentition, neither intra nor interarch.

Discussion

The timing of deciduous dentition has been studied by many researchers in different populations, finding differences between them [9,11,14,18–38]. Many studies assert that there are gender differences in the timing of primary dentition. In most of the studies reviewed, the authors find earlier eruption of primary teeth in males [9,11,14,18–27].

Of all the studies reviewed, ours finds the greatest gender differences. In our sample, all the primary teeth erupted earlier in boys, except for the first molars and maxillary central incisors. The biggest difference was found in the mandibular canines, which in boys erupted at 25.31 months and in girls

Table 5. Comparison of the average ages of eruption of primary dentition between genders.

	Boys		Girls		t-Test (p value)
	Mean	SD	Mean	SD	
Maxilla					
Central incisor	14.93	2.79	14.88	2.94	.07
Lateral incisor	15.21	2.72	15.30	2.79	.03*
Canine	25.31	4.23	25.95	4.28	.00*
First molar	21.80	3.73	21.31	3.96	.00*
Second molar	32.73	4.50	33.37	4.37	.00*
Mandible					
Central incisor	11.70	2.39	11.80	2.39	.52
Lateral incisor	23.76	5.46	23.76	5.56	.00*
Canine	25.31	3.82	26.10	3.80	.00*
First molar	22.0	3.60	21.47	3.82	.00*
Second molar	32.26	4.36	32.64	4.46	.05*

*Statistically significant value.

Table 6. Differences found in the literature in the eruption of primary teeth between genders.

Authors	Boys	Girls
Psoter et al. [18]	i ^{1*} , c ^{1*}	
Ramírez et al. [19]	i ₁ [*] , i ₂ [*] , i ₂ [*] , c ₁ [*]	
Choi and Yang [28]	i ₂ [*] , i ₂ [*] , m ^{2*} , c ¹	i ^{1*} , m ₁ [*]
Magnusson [30]		i ₁ [*] , i ₂ , m ₁ , m ₂ [*]
Soliman et al. [37]	Left i ² , i ₂ [*] , left m ^{1*}	Right i ^{2*}
Baghdady and Ghose [23]	i ₁ i ₂ , c ₁ , m ₁ , m ₂	i ¹ , m ₂
Al Jasser and Bello [20]		
Folayan et al. [21]	i ₁ , i ₂ , c ₁ , m ₁ , m ₂	
Boutourline and Tesi [27]	i ₁	
Sato and Ogiwara [26]	i ₁ , i ₂ , c ₁ , m ₁ , m ₂	m ₁
Hitchcock et al. [22]	i ₁ , i ₂ , c ₁ , m ₁ , m ₂	
Hägg and Taranger [14]	i ₁ , i ₂ , c ₁ , m ₁	m ² , m ₂
Nyström [25]	i ₁	
Robinow et al. [24]	i ₁ , i ₂ , c ₁ , m ₂	m ₁
Gupta et al. [31]	m ₁	i ₁ , i ₂ , c ₁ , m ₁ , m ₂
Kaul et al. [29]		i ₁ , i ₂ , c ₁ , m ₁ , m ₂
Holman and Jones [17]	i ₁ , i ₂	m ₁ , m ₂
Zadzinska et al. [9]	i ₁ [*] , i ₂ [*] , c, m ^{1*} , m ₁	m ₂
Burgueño et al. [38]	i ₂ [*] , i ₂ [*] , c ¹ , c ₁ [*] , m ² , m ₂ [*]	m ¹ , m ₁ [*]

*Statistically significant value.

at 26.10 months. These differences were statistically significant for all temporary teeth except for the central incisors (upper and lower).

In line with our results, some studies found earlier eruption of deciduous dentition in males, with significant differences in some teeth. This is the case of Psoter et al. [18], who found significant differences in the case of the upper central incisors and upper canines; and Ramirez et al. [19], who found significant differences in the lower central incisors, lateral incisors (upper and lower) and lower canines. Zadinska et al. [9] found statistically significant differences in the maxilla for the first and second incisors and for the first molars, and also in the mandible for both incisors (Table 6).

In other studies, dental eruption was also earlier in males but the differences were not significant. Some authors found early eruption for all primary teeth [20–22]. Other researchers asserted that early eruption occurred in certain dental groups [14,23–27] (Table 6).

Some authors, including Choi and Yang [28], observe that some teeth erupt first in males and others erupt first in girls, obtaining statistically significant differences in some cases as stated in Table 6. Hägg and Taranger [11] find that the first 16 primary teeth erupt first in males, while the last four temporary teeth emerge first in women.

In other studies deciduous teeth erupted earlier in girls, either generally or in certain dental groups. This is the case of Kaul et al. [29] and Magnusson [30], who obtained statistically significant differences in some cases. Gupta et al. [31] also found earlier eruption in girls except for the lower first molars, although none of these differences were statistically significant (Table 6). However, authors such as Lumbau et al. [32] and Leighton [33] do not find differences between both sexes.

The differences in development between both sexes has been the subject of study over a long time. It is known that testosterone levels are higher than the tenth to the twentieth week in the case of males [14], which could explain this advance in the eruption of the temporal teeth, given that the temporary dental formula is formed as throughout this period. The relationship between the movement of teeth in the jaws until the moment of their clinical emergence with the rate of growth factors released into the blood suggests that there may be differences in the rate of tooth emergence between both sexes [9].

If we compare the emergency ages obtained in our study with respect to the literature reviewed, we observed that the subjects of our study presented the later emergency ages, even when compared with other studies also carried out in European territory (Tables 7–10).

Regarding eruption symmetry, in our study we observed earlier eruption on the right side in both boys and girls, except for the upper lateral incisors, canines and first molars. The differences were statistically significant for the lower incisors, central and lateral, and the upper canines.

Other authors including Oziegbe et al. [34] noted slightly earlier eruption on the left side, especially in boys; and Lysell et al. [35] observed earlier eruption on the left side except for the lower canines. In none of these cases were the differences statistically significant (Table 11). Most of the authors reviewed found no differences in the emergence of homologous contralateral teeth and accepted a symmetry in the eruption of primary teeth. [18,23,25,28–31,36].

If we compare the emergence of primary teeth between both arches, we find differences in eruption which in some cases are significant. In our sample, in both sexes, the teeth of the upper arch appeared in the oral cavity before those of the lower arch, except for the central incisor and second molar, which emerged earlier in the mandibular arch. We found statistically significant differences in the case of the central and lateral incisors, and the second molars.

Regarding the average age of eruption of the lower lateral incisors, we noted large differences in comparison with the reviewed authors. In our study, the lower first molars erupt before the lower lateral incisors do, and this happened in both sexes. This is because, in our sample, in some older children the lower lateral incisors had not yet erupted so, on the one hand, these teeth emerged at a later age than in the other studies reviewed (with a larger standard deviation) and, on the other hand, the lower first molars tended to erupt before the lower lateral incisors. This fact has not been previously seen in the literature.

In the literature studied, Ramirez et al. [19], and Baghdady and Ghose [23] found earlier eruption in the maxilla, except for the central incisors and second molars which erupted

Table 7. Differences of eruption according to sex.

Reference	Upper second molar		Upper first molar		Upper canine		Upper lateral incisor		Upper central incisor	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Ramírez et al. [19] Spain	26.46 ± 3.78	27.62 ± 4.28	15.19 ± 1.81	15.40 ± 2.10	18.38 ± 3.08	19.29 ± 3.05	10.26 ± 2.16	11.22 ± 1.98	9.16 ± 2.35	9.80 ± 1.86
Leighton [33] England	26.28 ± 0.52	26.33 ± 0.33	14.55 ± 0.29	14.87 ± 0.21	17.51 ± 0.33	18.73 ± 0.34	10.19 ± 0.26	10.87 ± 0.20	8.92 ± 0.21	9.40 ± 0.23
Lumbau et al. [32] Italy	24	24	17.93	17.93	20.6	20.6	12.71	12.71	9.97	9.97
Lysell et al. [35] Sweden	28.89 ± 0.42	29.35 ± 0.41	16.08 ± 0.25	15.93 ± 0.22	19.30 ± 0.31	19.18 ± 0.33	11.20 ± 0.23	11.55 ± 0.27	10.01 ± 0.17	10.47 ± 0.21
Hägg and Taranger [14] Sweden	27.7 ± 4.31	27.9 ± 3.75	15.5 ± 2.08	15.6 ± 1.89	18.7 ± 3.15	19.5 ± 3.17	10.4 ± 2.40	11.1 ± 2.37	9.6 ± 1.85	9.8 ± 1.59
Nyström [25] Finland	27.40	26.75	15.30	14.65	17.95	18.10	10.10	10.25	9.15	9.45
Sato and Ogiwara [26] Japan	28.48 ± 3.88	28.78 ± 3.71	17.26 ± 2.34	17.34 ± 2.72	17.32 ± 2.74	18.89 ± 3.19	12.18 ± 2.57	13.22 ± 2.58	10.82 ± 2.33	10.95 ± 2.28
Holman and Jones [17] Japan	25.62 ± 2.72	26.05 ± 3.53	17.11 ± 2.23	16.99 ± 3.83	17.82 ± 2.18	17.77 ± 3.33	9.45 ± 1.81	9.88 ± 2.06	8.42 ± 1.69	8.54 ± 1.69
Holman and Jones [17] Indonesia	29.35 ± 4.10	28.31 ± 3.13	17.59 ± 2.61	17.03 ± 2.34	20.43 ± 3.63	20.54 ± 3.07	12.84 ± 2.99	13.17 ± 3.09	10.93 ± 2.36	11.29 ± 2.55
Holman and Jones [17] Bangladesh	27.57 ± 5.80	26.91 ± 4.95	16.00 ± 2.94	15.90 ± 2.61	20.44 ± 3.46	21.53 ± 3.77	13.36 ± 3.72	14.38 ± 3.85	11.43 ± 3.34	12.28 ± 3.30
Holman and Jones [17] Guatemala	27.87 ± 3.59	27.88 ± 3.97	16.20 ± 2.14	15.94 ± 2.52	18.93 ± 2.84	19.52 ± 3.23	11.13 ± 2.44	11.25 ± 2.66	10.32 ± 2.30	10.59 ± 2.33
Robinow et al. [24] Ohio	27.6 ± 4.0	28.4 ± 4.3	16.0 ± 2.3	15.7 ± 2.3	18.9 ± 2.7	20.1 ± 3.2	10.4 ± 2.4	11.9 ± 2.7	9.1 ± 1.5	9.6 ± 2.0
Hitchcock et al. [22] Australia	26.6 ± 3.7	28.1 ± 4.5	15.00 ± 1.9	15.40 ± 2.5	18.30 ± 3.1	19.1 ± 3.0	10.2 ± 2.4	10.9 ± 3.0	8.9 ± 1.6	9.1 ± 1.8

Maxillary arch, right side (middle ages ± standard deviations).
Longitudinal studies.

Table 8. Differences of eruption according to sex.

Reference	Upper second molar		Upper first molar		Upper canine		Upper lateral incisor		Upper central incisor	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Ramírez et al. [19] Spain	25.60 ± 3.62	25.72 ± 3.67	15.58 ± 2.10	15.82 ± 1.99	18.35 ± 3.16	20.08 ± 3.18	11.24 ± 3.01	12.94 ± 2.60	6.82 ± 1.66	7.60 ± 1.80
Leighton [33] England	25.60 ± 0.51	25.82 ± 0.38	14.69 ± 0.26	14.96 ± 0.19	17.78 ± 0.35	18.70 ± 0.36	11.06 ± 0.31	11.97 ± 0.30	6.95 ± 0.2	7.57 ± 0.22
Lumbau et al. [32] Italy	24	24	17.93	17.93	20.6	20.6	13.11	13.11	8.7	8.7
Lysell et al. [35] Sweden	27.14 ± 0.40	27.07 ± 0.34	16.39 ± 0.23	16.12 ± 0.24	19.92 ± 0.34	19.47 ± 0.35	13.23 ± 0.29	13.11 ± 0.37	7.88 ± 0.19	8.20 ± 0.26
Hägg and Taranger [14] Sweden	26.3 ± 3.82	26.2 ± 3.44	15.6 ± 2.22	15.9 ± 1.73	19.1 ± 3.19	20.3 ± 3.26	13.0 ± 3.12	13.4 ± 3.13	7.5 ± 2.10	7.9 ± 2.13
Nyström [25] Finland	26.35	25.30	15.60	15.15	18.45	18.80	11.80	11.85	7.0	7.15
Sato and Ogiwara [26] Japan	27.03 ± 3.67	27.35 ± 3.94	18.02 ± 2.4	17.79 ± 2.87	19.39 ± 3.13	20.08 ± 3.34	13.72 ± 2.85	14.02 ± 2.88	9.33 ± 2.19	9.43 ± 1.84
Holman and Jones [17] Japan	24.05 ± 2.76	24.06 ± 3.31	16.35 ± 2.52	16.69 ± 3.29	17.53 ± 1.44	17.37 ± 2.88	9.44 ± 1.71	9.67 ± 2.14	8.04 ± 1.65	8.07 ± 1.68
Holman and Jones [17] Indonesia	29.56 ± 4.75	27.60 ± 3.04	18.88 ± 2.90	18.32 ± 2.57	22.00 ± 3.91	22.13 ± 3.54	16.3 ± 3.83	16.22 ± 3.67	10.03 ± 2.36	10.35 ± 2.89
Holman and Jones [17] Bangladesh	28.13 ± 5.39	26.46 ± 3.80	17.76 ± 2.97	18.18 ± 3.68	21.75 ± 3.82	23.30 ± 5.06	16.13 ± 3.77	16.41 ± 4.51	10.37 ± 2.73	10.64 ± 2.89
Holman and Jones [17] Guatemala	27.27 ± 4.45	26.94 ± 3.95	17.83 ± 5.02	16.79 ± 2.62	19.89 ± 3.18	20.19 ± 3.26	13.68 ± 3.27	13.91 ± 3.06	8.24 ± 2.32	8.35 ± 2.30
Robinow et al. [24] Ohio	25.9 ± 3.8	27.1 ± 4.2	16.2 ± 1.9	15.6 ± 2.2	19.3 ± 2.9	20.2 ± 3.4	13.0 ± 2.8	13.8 ± 3.6	7.3 ± 1.6	7.8 ± 2.1
Hitchcock et al. [22] Australia	26.0 ± 3.0	26.8 ± 4.2	15.2 ± 1.7	15.6 ± 2.4	18.8 ± 3.3	19.2 ± 3.4	11.8 ± 2.7	12.4 ± 2.9	7.1 ± 1.8	7.2 ± 1.8

Mandibular arch, right side (middle ages ± standard deviations).
Longitudinal studies.

earlier in the mandible, in both sexes. On the other hand, Soliman et al. [37] observed earlier eruption of these dental groups in the upper jaw (Table 12).

To conclude the analysis of primary teeth eruption, we found differences in the sequence of eruption in comparison with the literature studied. Most of the studies reviewed agree that the sequence of eruption of primary teeth most

frequently observed is: lower central incisor, upper central incisor, upper lateral incisor, lower lateral incisor, maxillary first molar, mandibular first molar, upper canine, lower canine, lower second molar and upper second molar, and is the same in boys and girls.

However, in our study sample, the lower lateral incisor emerged behind the mandibular first molar in both sexes.

Table 9. Differences of eruption according to sex.

Reference	Second molar		First molar		Canine		Lateral incisor		Central incisor	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Nasser (2003) Saudi Arabia	28.16 ± 4.17	28.25 ± 4.19	16.88 ± 3.36	16.90 ± 3.36	21.14 ± 3.65	21.03 ± 3.66	13.09 ± 2.71	13.31 ± 2.72	11.19 ± 1.90	11.20 ± 1.90
Choi and Yang [28] Korea	24.99	26.01	15.38	15.38	16.36	16.36	9.35	10.06	8.24	9.27
Singh et al. [34] North of India	27.96 ± 3.24	27.96 ± 3.24	15.48 ± 1.20	15.60 ± 0.0	19.32 ± 1.44	19.32 ± 1.44	9.96 ± 0.84	9.96 ± 0.84	9.84 ± 0.96	9.0 ± 1.32
Kaul et al. [29] North of India	24.6 ± 2.0	25.2 ± 3.4	16.3 ± 3.3	16.0 ± 2.6	20.5 ± 1.7	16.9 ± 1.1	12.2 ± 2.0	9.8 ± 1.0	10.2 ± 1.5	8.8 ± 1.6
Baghdady and Ghose [23] Iraq	26.0 ± 6.1	27.0 ± 5.3	16.3 ± 2.9	16.4 ± 2.6	18.8 ± 4.1	19.9 ± 3.6	10.1 ± 2.4	11.4 ± 3.8	10.7 ± 2.6	10.6 ± 2.7
Gupta et al. [31] Nepal	26.67 ± 3.79	25.00 ± 5.10	15.86 ± 2.12	14.71 ± 4.82	19.10 ± 4.31	18.80 ± 11.73	14.00 ± 4.90	11.50 ± 0.71	12.67 ± 2.31	10.33 ± 3.08
Soliman et al. [37] Egypt	25.2 ± 3.6	29.9 ± 6.3	17.0 ± 3.6	16.8 ± 4.5	19.3 ± 3.8	19.9 ± 4.3	12.3 ± 4.1	13.3 ± 4.9	9.7 ± 2.10	10.0 ± 4.8
Folayan et al. [21] Nigeria	24.70 ± 4.28	25.61 ± 5.46	16.58 ± 2.75	16.34 ± 3.23	19.35 ± 3.63	19.54 ± 4.31	12.67 ± 3.19	13.18 ± 3.73	10.37 ± 2.30	10.45 ± 3.33
Obhioneh (2008) Nigeria	26.17 ± 5.52	26.13 ± 4.95	16.05 ± 2.91	16.02 ± 2.91	17.89 ± 4.00	18.22 ± 4.10	12.03 ± 2.91	12.92 ± 3.36	9.33 ± 1.88	10.08 ± 2.53
Psoter et al. [18] EEUU	27.9	27.9	15.7	15.7	19.5	19.5	10.6	10.6	9	9.9
Magnusson [30] Iceland	26.13 ± 3.23	25.11 ± 5.23	15.10 ± 2.91	14.95 ± 2.05	17.59 ± 2.71	17.98 ± 2.87	10.38 ± 3.09	10.16 ± 3.08	8.99 ± 2.53	9.21 ± 2.63
Zadzinska et al. [9] Poland	24.69 ± 3.83	24.13 ± 5.37	14.46 ± 2.94	15.78 ± 3.79	17.40 ± 3.30	17.89 ± 3.15	10.09 ± 2.21	11.84 ± 3.37	8.17 ± 2.45	8.93 ± 2.37
Burgueño et al. [38] Spain	32.73 ± 4.30	33.37 ± 4.37	21.80 ± 3.73	21.31 ± 3.96	25.31 ± 4.23	25.95 ± 4.28	15.21 ± 2.72	15.30 ± 2.79	14.93 ± 2.79	14.88 ± 2.94

Maxillary arch, right side (middle ages ± standard deviations).

Shaded in the table the results of the present study appear.

Cross-sectional studies.

Table 10. Differences of eruption according to sex.

Reference	Second molar		First molar		Canine		Lateral incisor		Central incisor	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Nasser (2003) Saudi Arabia	27.92 ± 4.06	27.97 ± 4.06	17.17 ± 2.72	17.13 ± 2.73	21.03 ± 3.72	21.10 ± 3.73	14.44 ± 3.60	14.61 ± 3.60	8.44 ± 2.80	8.49 ± 2.81
Choi and Yang [28] Korea	24.07	24.07	15.55	15.55	16.91	16.91	10.34	11.38	6.26	6.26
Singh et al. [34] North of India	27.60 ± 3.60	27.60 ± 3.60	15.48 ± 1.20	14.28 ± 1.68	18.96 ± 1.56	18.96 ± 1.56	11.04 ± 1.68	11.04 ± 1.68	7.92 ± 1.20	8.52 ± 0.60
Kaul et al. [29] North of India	25.6 ± 1.4	24.6 ± 1.4	16.2 ± 1.8	14.8 ± 1.6	19.0 ± 2.1	16.4 ± 4.3	13.4 ± 1.7	11.5 ± 1.1	7.9 ± 1.3	7.1 ± 1.1
Baghdady and Ghose [23] Iraq	26.0 ± 5.4	25.1 ± 5.3	16.9 ± 3.6	17.0 ± 2.8	19.0 ± 4.0	20.3 ± 4.0	14.0 ± 3.7	14.3 ± 3.2	9.2 ± 2.6	8.4 ± 2.2
Gupta et al. [31] Nepal	25.33 ± 8.09	27.00 ± 0.72	14.40 ± 5.59	16.25 ± 2.36	21.43 ± 3.46	21.50 ± 7.78	13.50 ± 0.71	12.00 ± 0.72	10.50 ± 0.71	9.50 ± 2.12
Soliman et al. [37] Egypt	25.7 ± 3.6	26.3 ± 5.0	17.0 ± 4.2	16.8 ± 4.6	20.2 ± 4.4	19.3 ± 4.1	13.2 ± 4.2	12.7 ± 4.5	8.1 ± 2.1	7.8 ± 5.5
Folayan et al. [21] Nigeria	24.52 ± 4.21	25.22 ± 4.97	16.57 ± 2.83	16.08 ± 3.04	19.92 ± 3.83	19.69 ± 4.16	12.92 ± 3.04	13.42 ± 3.63	7.86 ± 2.49	8.38 ± 2.97
Obhioneh (2008) Nigeria	24.12 ± 5.52	24.06 ± 4.71	16.34 ± 3.06	16.01 ± 3.14	18.47 ± 4.17	18.72 ± 3.93	12.41 ± 3.74	12.94 ± 2.84	7.55 ± 1.79	7.92 ± 2.77
Psoter et al. [18] EEUU	27	27	16	16	19.5	19.5	12.5	12.5	6.6	6.6
Magnusson [30] Iceland	25.62 ± 2.38	23.74 ± 4.14	16.16 ± 2.69	15.43 ± 2.47	19.16 ± 3.24	18.14 ± 2.28	12.08 ± 3.50	11.75 ± 2.63	8.03 ± 3.06	6.89 ± 2.16
Zadzinska et al. [9] Poland	24.75 ± 4.49	24.21 ± 6.39	15.55 ± 3.66	16.22 ± 4.30	17.23 ± 3.02	17.8 ± 5.16	11.36 ± 2.74	13.79 ± 4.38	6.24 ± 1.89	7.07 ± 5.11
Burgueño et al. [38] Spain	32.26 ± 4.36	32.64 ± 4.46	22.0 ± 3.60	21.47 ± 3.82	25.31 ± 3.82	26.10 ± 3.80	23.76 ± 5.46	23.76 ± 5.56	11.70 ± 2.39	11.80 ± 2.39

Mandibular arch, right side (middle ages ± standard deviations).

Shaded in the table the results of the present study appear.

Cross-sectional studies.

Zadzinska et al. [9] find the same sequence as our study, but only in 6.82% of boys and 5.26% of girls.

A previous pilot study in a smaller sample of children in the Region of Madrid (120 children, 62 boys and 58 girls) showed that in the case of girls the first molars, upper and

lower, erupted after the central incisors, preceding the lateral incisors, both upper and lower. In the case of boys, the upper first molar also erupted prior to the lateral incisors. However, these data could not be considered representative given the small sample studied [38].

Table 11. Differences found in the literature in the eruption of temporary dentition between both sides.

Authors	Left	Right
Oziegbe et al. [34]	i1, i2, c ¹ , c ₁ [*] , m1, m2	
Lysell et al. [35]	X	
Ramírez et al. [19]	X	
Burgueño et al. [38]	i ² , c ₁ [*] , c ₁ , m ₁	i ¹ , i ₁ [*] , i ₂ [*] , m ¹ , m ₂

*Statistically significant value.

Table 12. Differences found in the literature in the eruption of temporary dentition between both arches.

Authors	Maxilla	Mandible
Baghdady and Ghose [23]	i ² , i ₂ [*] , c1, m1	i ¹ , i ₁ [*] , m2 [*]
Folayan et al. [21]	i1, c1	i ¹ , i ₁ [*] , m1
Oziegbe et al. [34]	i2, c1, m1	i1, m2
Ramírez et al. [19]	i ² , i ₂ [*] , c1, m1	i ¹ , i ₁ [*] , m2
Kaul et al. [29]	i2	i1, c1, m1, m2
Burgueño et al. [38]	i ² , i ₂ [*] , c1, m1	i ¹ , i ₁ [*] , m2 [*]

*Statistically significant value.

Conclusions

Our conclusions are as follows:

1. Regarding the timing of primary teeth eruption in both sexes, earlier eruption of all primary teeth was observed in males, except for the first upper and lower molars and maxillary central incisor, and statistically significant results were obtained for all primary teeth except for the central incisors.
2. Most of the primary teeth erupted on the right side first in both sexes, except for the canines, the upper lateral incisors and lower first molars. The results were statistically significant in the case of the lower incisors and the upper canines.
3. When other characteristics of the eruption process were compared, we noted that while primary teeth eruption began at the same time in girls (10.92 months) as in boys (10.99 months), its duration was longer in females than in males (22.63 months in girls versus 21.96 months in boys).
4. No gender differences were found in the sequence of eruption of the deciduous dentition either intra or interarch.

Disclosure statement

No potential conflict of interest was reported by the authors.

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