



Relationship between gestational age, birth weight and deciduous tooth eruption



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KEYWORDS

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Abstract *Background:* Teething is a normal part of child growth and development. Growth parameters and feeding pattern may be determinants of the timing of teeth eruption in healthy infant. Primary tooth eruption may be affected by gestational age, postnatal nutrition, degree of prematurity as well as severity of neonatal illness.

Objectives: The aim of this study was to evaluate the relation between gestational age, weight and neonatal illness to the time of eruption of the first deciduous tooth.

Materials and methods: This study was a follow up prospective study carried out at the Bab El Sharia University hospital from October 2010 to October 2012. The study included 250 newborn from the obstetric department, from the NICU and from the outpatient clinics at the hospital. The babies were stratified according to gestational age to preterm (< 37 weeks): 72 cases and full term (> 37 weeks): 178 cases. The babies were followed from birth till the eruption of the first deciduous tooth.

Results: There was a negative linear correlation between the time of the first deciduous tooth eruption and birth weight. The eruption of the first deciduous tooth was delayed in babies admitted to NICU specially if there was major interference such as intubation, mechanical ventilation.

Conclusion: Delayed tooth eruption was related to lower birth weight and prematurity. The delayed eruption in preterm babies may be related to premature birth and not to a delay in dental development.

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Introduction

The time of formation, calcification and eruption of the deciduous teeth is subjected to several individual variations.

Nevertheless, under normal conditions, the time, sequence and chronology of the biological events follow a regular cycle. This process may be disrupted in preterm infants by nutritional deficiencies, exposure to certain medicaments and traumatic oral manipulations.¹

Growth parameters and feeding pattern may be determinants of the timing of teeth eruption in healthy infant.² Some studies suggest that primary tooth eruption is related primarily to gestational age and severity of neonatal illness, postnatal

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nutrition as well as the degree of prematurity. Other studies reported that the eruption pattern in primary dentition is related to low and normal birth weight.³

Premature and low birth weight babies can have delayed primary tooth eruption and enamel defects, putting them at higher risk for decay later on.⁴

The process of teething can be a difficult time for both the child and parents. When new teeth pierce or erupt from the gums, discomfort, pain and fussiness can result.⁵

Teething usually begins between 4 and 9 months and most babies will have their first tooth by their first birthday. However, every baby is different and the start and duration of the teething process can vary greatly between individuals. Around one in 2000 babies is actually born with one tooth or two already and are called natal teeth, while others do not show any until they are 12 months. There is no need to worry if infant's teeth appear particularly early or late, the timing are not believed to be any indication whether the infant is developing well, either physically or mentally.⁶

Tooth eruption is a series of metabolic events in alveolar bone characterized by bone resorption and formation on opposite sides of the dental follicle and the tooth does not contribute to this process.⁷

Tooth eruption is influenced by pituitary growth hormone, thyroid hormone and parathyroid hormone-related protein; all are required for normal tooth eruption.⁸

Certain vitamins and hormone deficiencies, if present during tooth formation will adversely affect formative cells and the matrix they produce. Reduced organic matrix content may result in production of hypoplastic tissue. A hypoplastic matrix that is also hypomineralized would result.⁷

Aim of the study

The aim of this study was to evaluate the relation between gestational age, birth weight, neonatal illness and the eruption time of the first deciduous tooth.

Patients and methods

This study was a follow up prospective study. It was carried out in the Bab El Sharia University hospital from October 2010 to October 2012, the study included 250 newborn from the obstetric department, NICU and from the outpatient clinics at the hospital. They were selected by a simple random method. The babies were stratified according to:

- Gestational age:
Preterm (< 37 weeks): 72 cases and full term (> 37 weeks): 178 cases.
- Birth weight into 3 groups:
Very low birth weight (VLBW) (< 1.5 kg): 32 cases.
Low birth weight (LBW) (1.5–2.5 kg): 38 cases.
Normal birth weight (NBW) (> 2.5 kg): 180 cases.

The babies were followed up from birth till the eruption of the first deciduous tooth.

Inclusion criteria

- Gestational age from 30 to 42 weeks.
- Birth weight from 1200 g.
- No symptoms or signs of endocrinal disease e.g. Hypothyroidism.

Exclusion criteria

Any newborn with bone disease especially osteopenia of prematurity, genetic disease or congenital malformations were excluded from the study.

For each newborn the following were collected:

- (A) Detailed history and oral examination
This was done by frequent oral examination (inspection and palpation) with good illumination carried out by the pediatrician with consent of the parents.
- (B) Recording of these data
 - Gestational age, birth weight, sex, mode of delivery, multiple pregnancies, maternal illness, NICU admission (if present).
 - Types of feeding since birth
 - Any significant illness since birth.
 - Vitamin D intake and its dose.
 - Family history of delayed teething.
 - Which tooth erupted first.

Follow up of these infants from the 3rd month till the eruption of the first deciduous tooth was done weekly on regular medical visits. The study received ethical approval from the ethics committee of Al Azhar faculty of Medicine.

Some definitions were taken into consideration:

Chronological age = from moment of birth

Corrected age = gestational age + chronological age

Statistical analysis

Statistical analysis was performed with Epi – info software, version 6.04 in public domain. Descriptive statistics including the mean and standard deviation for each group was calculated. Descriptive analysis of the presented data was used through tables. For comparison of data, correlation with the eruption of the first deciduous tooth, the parametric Student's *t* test and non-parametric ANOVA test were used for independent samples. The minimum significant level adopted was 5% (0.05).

Results

The study included 122 (48.8%) males and 128 (51.2%) females. The gestational age of the studied groups (mean \pm SD) were 36.5 ± 2.82 weeks. Their birth weights were 2.77 ± 0.96 kg. Further demographic data of the studied groups ($n = 250$) are presented in Table 1.

The mean eruption in full term was 7.97 ± 2.62 months while it was 9.32 ± 1.48 in preterm infants. There was a high

Table 1 Demographic data of the studied groups ($n = 250$).

Variables	Data
<i>Gestational age (weeks)</i> (Mean \pm SD)	36.51 \pm 2.84
<i>Maturity</i>	
Full term \geq 37 weeks	178 (71.2%)
Preterm < 37 weeks	72 (28.8%)
<i>Birth weight (kg)</i> (Mean \pm SD)	2.77 \pm 0.96
<i>Sex</i>	
Males	122 (48.8%)
Females	128 (51.2%)
<i>Mode of delivery</i>	
Cesarean section	131 (52.4%)
Vaginal delivery	119 (47.6%)
<i>Single</i>	228 (91.6%)
<i>Multiple</i>	22 (8.4%)
Total No.	250 (100%)

statistical significant difference between full term and preterm infants regarding the eruption of the first primary tooth, $p = 0.0001$ (Table 2).

The mean first primary tooth eruption of both groups (preterm and full term) was 7.47 ± 1.23 and 7.97 ± 2.62 respectively. There was no statistical significant difference between both groups regarding the eruption after correction of gestational age, ** $p = 0.122$ (Table 3).

In low birth weight infants < 1.5 kg the mean eruption was 9.81 ± 1.47 while in infants with birth weight ≥ 1.5 kg it was 8.03 ± 2.63 . There was a high statistical significant difference between time of first tooth eruption and birth weight, $p = 0.0001$ (Table 4 and Fig. 1).

Admitted cases to NICU ($n = 102$) had significant delay in the eruption of the first tooth with mean eruption of

Table 2 Relation between eruption of the first primary tooth and gestational age of infant.

First tooth eruption/month	Preterm (< 37 weeks) $n = 72$	Full term (≥ 37 weeks) $n = 178$	T-test	p-value
Range	6–14	4–15	4.11	0.0001*
Mean \pm SD	9.32 \pm 1.48	7.97 \pm 2.62		
Median	9	7.5		

* Highly significant p value.

Table 3 Corrected gestational age for preterm infants (< 37 weeks) in comparison to full term infants regarding tooth eruption.

First tooth eruption/month	Preterm (< 37 weeks) after correction $n = 72$	Full term (≥ 37 weeks) $n = 178$	T-test	p-value
Range	4.5–11	4–15	1.55	0.1222
Mean \pm SD	7.47 \pm 1.23	7.97 \pm 2.62		
Median	7	7.5		

9.14 ± 1.79 months. There was a high statistical significant difference between infants in time of first tooth eruption in relation to the admission to NICU, $p = 0.0001$ (Table 5 and Fig. 2).

The mandibular (lower) incisors erupted first in most of the studied infants (98%) (Table 6 and Fig. 3).

Discussion

Many efforts have been made in order to increase the knowledge about tooth eruption, not only about the chronology and sequence of eruption but also about the causes that may interfere with the eruptive process.

This study is concerned about factors that may affect time of eruption of the first deciduous tooth especially gestational age and birth weight and neonatal illness (if present). The demographic data of the studied cases are presented in Table 1.

Considering the chronological age in preterm infants, the study showed a delay in the time of eruption of the first deciduous tooth in preterm infants when compared to full term infants with statistical significant difference ($p = 0.0001$) (Table 2). However, when the corrected age is considered there was no statistical significant difference ($p = 0.122$) (Table 3). This means that the delayed eruption in preterm babies may be related to premature birth and not to a delay in dental development.

The results were similar with previous studies presented by Ramos et al. in 2006 that compared the beginning of eruption of the first deciduous tooth in preterm with full term infants. The author collected 146 infants; 77 preterm and 69 full term ranging from 5 to 36 months old of both genders and results showed that when chronological age is considered, tooth eruption in preterm and very low birth weight infant was importantly delayed, however when corrected age is considered, no statistical significant differences were found among groups.¹

The same finding was found in a study done by Seow in 1997 who concluded that infants with the lowest birth weight and shortest gestational ages have the lowest rates of dental development.⁹

In a study done by Viscardi et al. in 1994 who studied two preterm groups; 14 preterm infants whose first tooth erupted at ≤ 10 months chronologic age (normal group) and 21 preterm infants whose first tooth erupted at > 10 months (late group) tooth eruption occurred significantly later in children with BW < 1000 g ($t = 3.4$, $p < 0.01$) or ≤ 30 weeks ($t = 2.41$, $p < 0.05$). Viscardi et al. suggested the impact of other neonatal factors (other than birth weight and gestational age) which affect teething like early enteral feeding, oral vitamin supplement and duration of oral intubation.¹⁰

The results showed a significant relation between the birth weight and the time of eruption of the first tooth when the chronological age is used (Table 4 and Fig. 1). Infants whose birth weight < 1.5 kg had their first tooth erupted later when compared to whose birth weight between 1.5 and 2.5 kg and to those whose birth weight > 2.5 kg ($p = 0.0001$).

Other studies showed similar results to ours, as in those carried by Aktoren et al. in 2010 that showed a significant relationship between the gestational age, birth weight of infants, and primary tooth eruption. Infants with a gestational age of less than 37 weeks and infants with a birth weight lower than

Table 4 Relation between eruption of the first primary tooth and birth weight of infants.

First tooth eruption/month	< 1.5 kg n = 32	1.5–2.5 kg n = 38	≥ 2.5 kg n = 180	F test	p-value
Range	6–14	6–11	4–15	8.19	0.0001
Mean ± SD	9.81 ± 1.47	8.68 ± 1.34	8.03 ± 2.63		
Median	10	9	8		

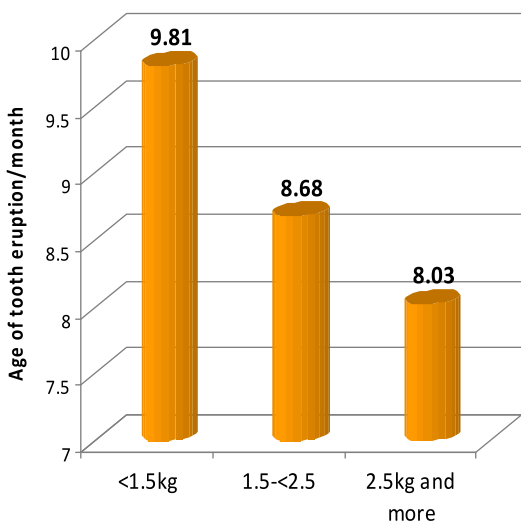


Figure 1 Mean age of 1st tooth eruption in relation to weight.

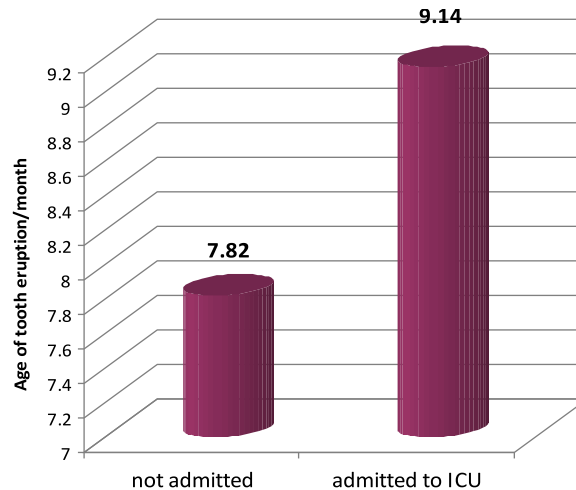


Figure 2 Mean age of 1st tooth eruption in relation to admission to NICU.

Table 5 Relation between eruption of the first primary tooth and admission of infant to NICU.

First tooth eruption/month	Not admitted to NICU n = 148	Admitted to NICU n = 102	T test	p-value
Range	4–15	6–14	4.36	0.0001
Mean ± SD	7.82 ± 2.65	9.14 ± 1.79		
Median	7	9		

Table 6 Type of the first erupted tooth for the studied group (n = 250).

Type of the first erupted tooth	Data
Lower incisor (mandibular)	245 (98%)
Upper incisor (maxillary)	5 (2%)

2500 g demonstrated significant delayed eruption of the first primary tooth.³

In a study done by Sajjadian et al. in 2010, they demonstrated a negative linear correlation between birth weight and the time of first deciduous tooth eruption ($r = -2.19$, $p = 0.008$), suggesting that deciduous teeth erupt earlier in infants with higher birth weight.¹¹ This result is similar to that of Fadavi et al. in 1999 and Lawoyin et al. in 1996 who found that birth weight and infant age were inversely related to time of first dental eruption.^{12,13} But, Andrade and Bezerra in 1998 did not find any delay in the chronology of eruption of deciduous teeth in high-risk infants (born under weight < 2500 g, premature < 37 weeks, born with respiratory problems or hypoglycemia or with other problems). However, they attributed this circumstance to the fact that they did not study infants whose birth weight was very low. They studied only infants with low birth weight and normal birth weight who did not show any difference in eruption.¹⁴

As regards the average chronological age of eruption of the first deciduous tooth was from 4 to 14 months for male infants

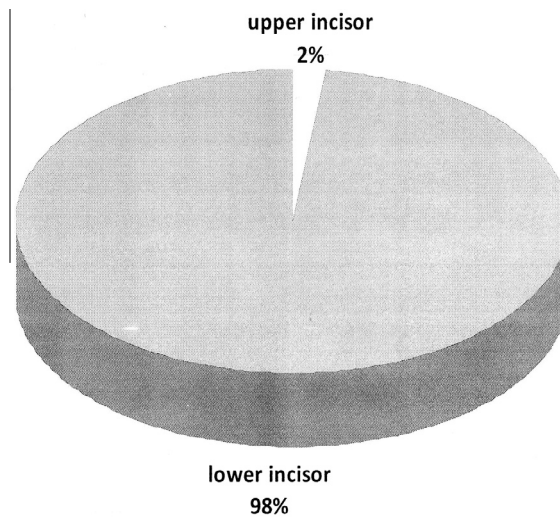


Figure 3 Type of the first erupted tooth.

and from 4 to 15 months for female infants. Such results show that there was no significant relation between gender of infants and their chronological age in the average ($p = 0.49$). These

results were in agreement with those found by Viscardi et al. in 1994 and Sajjadian et al. in 2010.^{10,11}

These results are also similar to the results of El-Mogi et al. in 2011 who found no statistical significance of mean eruption time and gender.¹⁵ However, the study of Choi and Yang in 2001 on Korean infants showed that teeth erupt earlier in male than in female ones.¹⁶

There was a high statistical significant difference between infants in time of first tooth eruption in relation to type of feeding ($p = 0.0001$). The eruption of the first deciduous tooth is earlier in babies who received only breast milk in the first 6 months of life as compared to breastfed plus formula or as compared to breast fed and cow milk or formula only. This was in agreement with Eesti Arst in 2007 who stated that the eruption of the first tooth in preterm children was earlier in those who received breast milk up to 3 months compared to the non breast fed children.¹⁷

Neonatal diseases necessitated NICU admission (respiratory distress, prolonged oral intubation, neonatal infection and prematurity) affect significantly the time of tooth eruption (Table 5 and Fig. 2). These results suggested that factors related to severity of neonatal illness as well as degree of prematurity affect timing of primary tooth eruption.

Teething started in most of the studied cases in mandibular incisor (98%) (Table 6 and Fig. 3) with less present (2%) in maxillary one. This in agreement with most of authors and literatures which stated that the mandibular incisors erupt before maxillary incisors.¹⁸

Conclusion

Birth weight was inversely related to the time of eruption of the first deciduous tooth, suggesting that delayed tooth eruption may be related to lower birth weight.

Preterm infants were delayed in their first deciduous tooth eruption if compared with full term infants but when corrected age is considered, no statistical significant differences were found among groups so, the delayed eruption in preterm infants may be related to premature birth and not to a delay in dental development. There was no significant correlation between gender and time of eruption of the deciduous tooth.

Conflict of interest

None declared.

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