

Prematurity and Dental Outcomes: A Short Communication Study

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ABSTRACT

Background: The development of the teeth is affected by gestational age, and premature neonates are at greater risk for developing dental problems. In the present study, the deleterious effects of preterm birth on orodental tissues and structures were reviewed.

Methods: A detailed research was carried out on MEDLINE, PubMed, and Google Scholar databases. English articles up to June 2019 were included and the search process was performed using the following keywords: "Dental outcomes", "Tooth", "Preterm", "Prematurity", and "Neonate".

Results: Literature review has revealed that alteration of tooth crown sizes, quantitative loss of enamel (i.e., enamel hypoplasia), and qualitative change in the enamel opacity (i.e., translucence appearance), or a combination of all are common in premature newborns. Delayed eruption of the first deciduous tooth is frequent among preterm neonates. Prematurity may also influence dental occlusion development, asymmetry in the jaws, and lateralization. Neonates with immature organs and enzymes are at greater risk for some complications, such as hemolytic jaundice and cholestasis. These complications, in addition to hyperbilirubinemia, may result in yellow, brown, or dark green discoloration in the primary teeth.

Conclusion: Some measures can be adopted to improve dental outcomes in premature neonates, including prevention of preterm birth, avoiding problems associated with oral intubation, gentle passing and moistening oral tube feeding, and oral care with colostrum and soft swabs.

Keywords: Dental outcomes, Neonate, Prematurity, Preterm, Tooth

Introduction

The development of the dentition begins from the 4th week of pregnancy. At week 8 of pregnancy, the primary tooth development starts to form, and the permanent teeth begin to develop several months before birth (Table 1) (1). These developmental and critical stages are affected by gestational age. The literature review has shown that premature neonates are at greater risk for developing dental problems. Some of the prevalent dental defects in premature newborns are delayed tooth eruption, quantitative loss of enamel (i.e., enamel hypoplasia), tooth discoloration, alveolar ridge notching, high-arched palate, palatal groove, posterior cross-bites, and palatal asymmetry, as well as the increased risk for needing braces and developmental defects of

both the primary and permanent teeth (2-4).

Methods

A short communication study was performed in Maternal, Fetal, and Neonatal Research Center, affiliated to Tehran University of Medical Sciences, Tehran, Iran, in 2019. Moreover, detailed research on MEDLINE, PubMed, and Google Scholar databases was carried out (up to June 2019). English articles were included and the search process was performed using the following keywords: "Dental outcomes", "Tooth", "Preterm", "Prematurity", and "Neonate". The deleterious effects of preterm birth on the orodental tissues and structures, as well as their maldevelopment, were also reviewed.

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Table 1. Chronology of primary and permanent teeth development by Uzuner et al. (1)
Chronology of Tooth Development, primary Dentition

Tooth	Calcification Begins		Crown Completed		Eruption		Root Completed	
	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibular
Central	14 wk in utero	14 wk in utero	1½ mo	2½ mo	10 mo	8 mo	1½ yr	1½ yr
Lateral	16 wk in utero	16 wk in utero	2½ mo	3 mo	11 mo	13 mo	2 yr	1½ yr
Canine	17 wk in utero	17 wk in utero	9 mo	9 mo	19 mo	20 mo	3¼ yr	3¼ yr
First molar	15 wk in utero	15 wk in utero	6 mo	5½ mo	16 mo	16 mo	2½ yr	2¼ yr
Second molar	19 wk in utero	18 wk in utero	11 mo	10 mo	29 mo	27 mo	3 yr	3 yr

Chronology of Tooth Development, Permanent Dentition

Tooth	Calcification Begins		Crown Completed		Eruption		Root Completed	
	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibular	Maxillary	Mandibular
Central	3 mo	3 mo	4½ yr	3½ yr	7¼ yr	6¼ yr	10½ yr	9½ yr
Lateral	11 mo	3 mo	5½ yr	4 yr	8¼ yr	7½ yr	11 yr	10 yr
Canine	4 mo	4 mo	6 yr	5¼ yr	11½ yr	10½ yr	13½ yr	12¼ yr
First premolar	20 mo	22 mo	7 yr	6¼ yr	10¼ yr	10¼ yr	13¼ yr	13¼ yr
Second premolar	27 mo	28 mo	7¼ yr	7¼ yr	11 yr	11¼ yr	14¼ yr	15 yr
First molar	32 wk in utero	32 wk in utero	4¼ yr	3¼ yr	6¼ yr	6 yr	10¼ yr	10¼ yr
Second molar	27 mo	27 mo	7¼ yr	7¼ yr	12¼ yr	12 yr	15¼ yr	16 yr
Third molar	8 yr	9 yr	14 yr	14 yr	20 yr	20 yr	22 yr	22 yr

Results

The deleterious effects of preterm birth on orodental tissues and structures, as well as their maldevelopment, are reviewed as follow

Crown size

There is a large body of evidence showing that genetic, environmental, maternal, and neonatal factors may affect the tooth crown dimensions. The examination of the relationship between preterm birth and crown dimensions revealed that both increase and decrease were observed in tooth crown dimensions in premature neonates. Accordingly, boys had larger teeth crown size, compared to that in girls. It was also found out tooth crown dimensions were larger in premature black girls than in their white counterparts. Maternal complications, such as hypothyroidism, diabetes, hypertension, and smoking, which can impact the size of the fetus and the duration of pregnancy, may influence the dimensions of the tooth crowns. In this respect, smaller teeth are observed in neonates with small size at birth, small for gestational age (5-8).

Enamel

The tooth enamel, in contrast to other bones, is the only hard tissue that is not remodeled. Therefore, any changes in its developmental stage can cause permanent dental defects. Previous studies have shown that quantitative loss of enamel (i.e., enamel hypoplasia), qualitative change in the enamel opacity (i.e., translucence appearance), or a combination of both in the primary dentition are prevalent among premature newborns. Moreover, the enamel defect is strongly associated with low birth weight. Although birth weight can be considered as a significant risk factor, it seems neonatal complications (e.g., sepsis, respiratory distress syndrome, asphyxia, metabolic disorders, and hyperbilirubinemia), various necessary therapies (e.g., antibiotic consumption, parenteral nutrition, supplement prescriptions, and ventilatory assistance) would be the other risk factors for such complications among premature neonates (9-11).

The tooth eruption

Delayed tooth eruption has a significant

relationship with low birth weight, gestational age, postnatal nutrition, neonatal disease severity, as well as the degree of prematurity. Delay in the first deciduous tooth eruption is frequent among preterm neonates with a birth weight of < 1000-1500 g or gestational age of < 30 weeks. The tooth eruption is also influenced by different maternal and neonatal hormonal complications, weight gains after birth, and nutritional and vitamin deficiencies. In this regard, the secretion of growth hormone, thyroid hormone, parathyroid hormone, and consumption of certain vitamins are necessary for normal tooth eruption (12, 13).

Occlusal relationships and asymmetry

In addition to genetics and environmental factors, prematurity may also influence occlusal development, asymmetry in the jaws, and lateralization. Prematurity and its consequent adaptation to extra-uterine nutrition cause early masticatory muscle activity and early catch-up growth. Moreover, postnatal molding of the head shape, neonatal support procedures, such as tracheal intubation, and other medical cares are also among the important risk factors for the alteration of the palatal configuration, palatal grooves, and deeper palates (14, 15).

Teeth discoloration in hyperbilirubinemia

Premature neonates with immature organs and enzymes are at greater risk for some complications, such as viral infection, sepsis, hemolytic jaundice, and cholestasis, leading to hyperbilirubinemia. Hyperbilirubinemia causes bilirubin deposition in all body tissues. Although this condition disappears from the soft tissues after a while, it remains in such hard and compact tissues as the teeth (16). Former studies have confirmed the effects of prolonged hyperbilirubinemia on intrinsic pigmentation (i.e., yellow, brown, or dark green discoloration) in the primary teeth. High levels of bilirubin can deposit in mineralized tissues leading to teeth pigmentation and staining (17-19).

Discussion and Conclusion

In the present study, some effects of birth prematurity on developing dental problems were determined. Since the crown size and tooth color, symmetry, and eruption are affected by preterm birth, the following suggestions are provided to improve dental outcome in such cases:

- All efforts should be devoted to prevent preterm birth.
- Problems associated with oral intubation should be decreased by using soft and flexible tracheal

tubes as well as gentle suctioning.

- Nutritional support should be performed through a gentle passage of oral feeding tubes.
- Tube moistening before passing would be beneficial.
- Oral care should be routinely performed with colostrum and soft swabs.
- Neonates with a history of preterm birth, like other newborns, are prone to teeth staining due to insoluble ferric components in iron supplements. Therefore, diluting iron supplements with water and other liquids or dripping it on the posterior parts of the oral cavity can keep the tooth from iron-related discoloration (20).

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Conflicts of interest

The author declares that there is no conflict of interest.

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