

* Original article

Prevalence of Enamel Defects in Primary Teeth of Children Born Prematurely

Katia Martins Guerra

Dentista do Ministério da Saúde e minha concentração é a implantação de políticas públicas de saúde – IMS-UERJ.

kcmg@click21.com.br

Simone Rodrigues dos Santos

Odontopediatra servidora do Hospital dos Servidores do Estado - Hospital dos Servidores do Estado.

sisantos21@yahoo.com.br

DOI:10.3395/reciis.v5i3.446en

Abstract

The aim of this study was to evaluate the prevalence of enamel defects in primary teeth of children born prematurely. We evaluated 90 children, aged between 2 and 6 years of age, and the inclusion criterion was the presence of at least 04 (four) primary teeth in the oral cavity. Clinical examination was carried out visually with the aid of wooden spatula under natural light, and assessed the presence of enamel defects. Data were tabulated and analyzed in Excel. The proportion of enamel defects was 39%, the highest frequency of hipocalcification (56%) than hypoplasia (44%). It was concluded that the prematurity factor positively influenced the occurrence of enamel defects.

Keywords: enamel defects; deciduous tooth; premature

Introduction

World Health Organization (WHO) classifies newborns according to gestational age and birth weight. Preterm infants (RNPT) or premature babies are born before 37 weeks and at term are those born between 37 and 42 weeks. They are born with low birth weight of less than 2,500 g.

Premature births are equivalent to 6-10% of all live births. In Brazil, the proportion of premature babies has doubled in one decade. If in 1999, 121000 were born preterm, representing 3% of births, in 2005 almost 200000 were born preterm (SEGATTO, 2008).

The etiology of preterm birth is usually multifactorial. It may be related to diseases of the fetus or the mother, such as placental changes, excessive amniotic fluid, maternal age, infections, primiparity, hypertension, among others (FERREIRA et al., 2003). However, according to Seow (1997), in most cases the etiology is unknown.

For Machado and Ribeiro (2004), preterm and/or low birth weight children have a higher prevalence of enamel defects in deciduous teeth compared with children born at term and with

normal birth weight. The hypocalcification is the most prevalent enamel defect, preferentially located in the anterior maxilla.

According to Pinkham (1996), premature babies or with low birth weight seem to have the highest correlation with enamel hypoplasia and hypocalcification in deciduous teeth.

According to Macedo et al. (2003), the emergence of defects in dental tissues may be related to systemic disorders suffered by pregnant women or problems that affected the child in the perinatal period or early stages in life, and it also may be associated with trauma with a laryngoscope and endotracheal intubation.

The most characteristic systemic disorders in preterm infants, according to Seow (1997), are birth asphyxia, apnea crisis, respiratory failure, early hypocalcemia, etc. As with other body tissues, the oral structures are also affected by premature birth.

Being the tooth enamel the only hard tissue not restored, the changes resulting from aggression during growth and development are permanently recorded (HOFFMANN et al. 2007; SEOW, 2007).

According to Shafer (1987), hypoplasia may be defined as incomplete or defective formation of the organic matrix of tooth enamel. There are basically two types: Hereditary, called amelogenesis imperfecta, and the other is caused by environmental factors, such as deficiencies of vitamins A, C and D, exanthematous diseases, congenital syphilis, birth trauma, prematurity, feverish conditions, diabetes, rubella, hypertension, eclampsia, fetal erythroblastosis; local infection or trauma, chemical poisoning, and idiopathic.

Hypoplasia is, along with hypocalcification, a major expression of pathological amelogenesis, manifested by pits, grooves or even total absence of enamel, being this is a quantitative defect. Hypocalcification, expressed in white to opaque, yellowish or brownish areas in enamel surface of normal contour, could be considered a qualitative defect in its translucency (BHASKAR, 1989; SEOW, 1997).

The prevalence of enamel defects in premature infants found in literature is high, but variable. Caixeta et al. (2005) observed 100 premature infants, 35% with defective enamel. Johnsen et al. (1984), among 67 premature infants with very low birth weight, found 52% with defects. Funakoshi et al. (1981) observed in 29 children born with less than 34 weeks 41.4% with defects. From 102 children with enamel defects examined by Lunardelli and Peres (2006), 68% were premature. Macedo et al. (2003), in 110 premature infants, found that 78.18% had enamel defects.

Differences in prevalence of enamel defects in preterm infants found in the studies are related to different age groups involved in the researches. In those researches involving children from 03 years of age, the percentage was higher, since the likelihood of various deciduous teeth present enamel defects is large due of their developing periods. Consequently, they included infants less than one year of age who had a lower prevalence rate (HOFFMANN et al. 2007).

In the research by Macedo et al. (2003), children born between 33 and 37 weeks had more defects in their teeth (deciduous and permanent) than those born with less than 32 weeks. Children weighing 1500g to 2500g had higher prevalence of defects than those born under 1500g. The frequency of opacities was higher than that of hypoplasia (60.9% versus 10.9%),

and the prevalence of birth defects in children intubated was 46.87%. However, it was stated that the tube could not be the certain cause of defects.

Lima and Duarte (2000) found a prevalence of 43% of enamel defects in 100 children born with low birth weight and 7% in 100 children born with normal weight. Among the enamel defects, hypocalcification (opaque) white/beige was the most common (43.3%), while the percentage of hypoplasia was 25, maxillary teeth being the most affected (68.3%). They also observed that 50% of these dental elements had treatment needs.

Although a significant association between preterm birth and/or low birth weight and a higher prevalence of caries in primary teeth has not been definitively established yet, Machado and Ribeiro (2004) agree that it is lawful for premature infants and/or with low birth weight to have some risk factors for the development of caries.

To Ferrini et al. (2007), structural changes in the enamel of premature children can determine their weakness, which predisposes to the formation of favorable sites for adhesion and colonization of cariogenic bacteria, raising the risk of developing caries, which can be enhanced under certain dietary habits and inadequate oral hygiene habits.

According to current knowledge, the highest frequency of enamel hypoplasia and predisposing factors for a possible increase in the prevalence of dental caries among premature infants and/or with low birth weight, especially those with very low birth weight, allows to classify them as children at high risk for this disease (MACHADO and RIBEIRO, 2004).

Material and methods

The aim of this research was to assess the relationship between premature birth and hypoplasia and hypocalcification (opacities) in dental enamel, seeking to assess how often that occurs.

Ninety children diagnosed at birth as premature ranging from 01 to 06 years of age were selected. They were under pediatric follow up at the clinic of the Hospital Federal dos Servidores do Estado (HSE) located in Rio de Janeiro, from October 2007 until December 2008. They were investigated based on the assumption that they should have a higher prevalence of enamel defects. As inclusion criterion, minors should have at least four primary teeth erupted in the oral cavity. All children were examined sitting in an ordinary chair, under natural light. To ward off the soft tissues, such as tongue and cheek, disposable wooden spatulas were used. The finding of whether or not the enamel defects in deciduous teeth were present was performed by visual clinical examination by two evaluators, the authors of this research. The data were recorded in a medical record only for the teeth that had the disease.

The enamel defects were diagnosed through the observation of pits, grooves or diffuse whitish, yellow or yellowish-to-white spots, located in the middle third, incisal or occlusal area, which have reached a tooth or teeth group (which are formed in the same period).

The other variables were: birth weight, gender, sex, height, gestational age at delivery, type of delivery, maternal illness, medications used during pregnancy and therapies. These data were collected from medical records of the recruited subjects.

After collecting the data, these were tabulated and analyzed in Excel.

Results

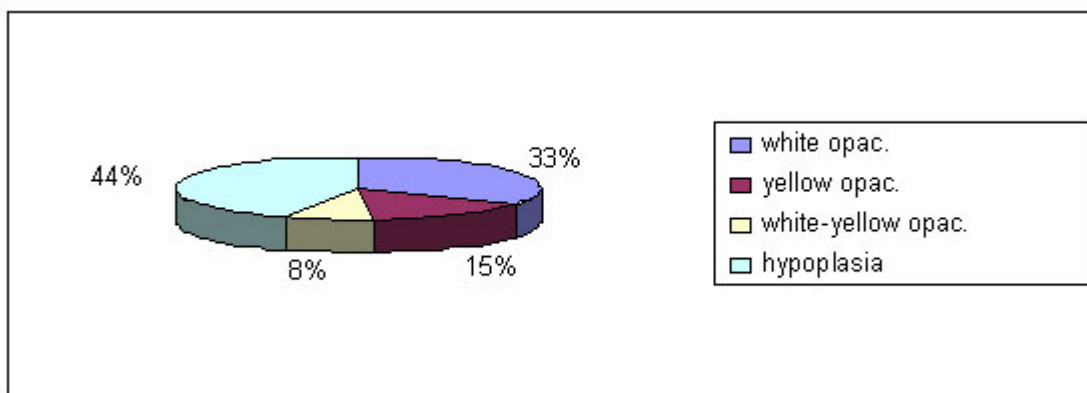
In a pool of 90 premature infants examined, the enamel defects appeared in 39 (43%), being females the most affected (21 children, 54%) and 23 events occurred with melanoderma (52%), as shown in Table 1.

Table 1. Distribution of teeth showing enamel defects in preterm children related to gender and color.

	Gender		Color	
	Female	Male	Leukoderma	Melanoderma
Enamel Defect	21(54%)	18(46%)	16(41%)	23(59%)
No Enamel Defect	27	24	23	28
Total	48	42	39	51

From the 39 events of enamel defects, it was noticed that the most common were hypocalcifications or opacities (22 cases, 56%) and hypoplasia (17 cases, 44%). Regarding opacities, the most frequent were white (13 events, 33%) followed by yellow (06 events, 15%) and yellowish-to-white (03 events, 8%) as seen in Figure I.

Figure I - Distribution of Enamel Defects Regarding Opacities and Hypoplasia.



The dental elements most affected with enamel defects were 61 and 51, with values of 22% and 21%, respectively (Tables 2 and 3).

Table 2 - Prevalence of Dental Elements with Enamel Defects

55	54	53	52	51	61	62	63	64	65
02	05	03	16	27	28	10	03	07	02
1,6%	4%	2,4%	12,8%	21,6%	22,4%	8%	2,4%	5,6%	1,6%

Table 3 - Prevalence of Dental Elements with Enamel Defects

85	84	83	82	81	71	72	73	74	75
01	04	01	-	03	04	02	03	03	01
0,8%	3,2%	0,8%	-	2,4%	3,2%	1,6%	2,4%	2,4%	0,8%

Participants who had enamel defects had an average weight of 1.382g, height of 39cm and gestational age at birth of 30 weeks, in contrast to other subjects with 1.316g, 38cm and 31 weeks. The most prevalent maternal illness was pregnancy exclusive hypertension, followed by chronic hypertension. The predominant type of delivery was cesarean.

The anti hypertensive drugs were cited as the most used by pregnant women, but we have no reliable data showing the correlation with changes in tooth enamel due to the unreliability of the information, since we did not have access to the medical records of mothers during the prenatal period.

In the treatment of preterm infants, the most prevalent occurrences were intubation, transfusion and use of antibiotics, but the data are unreliable due to errors of standardization in the medical records of children.

Discussion

Prematurity is accompanied by various medical problems that may affect the development of oral structures, such as tooth enamel, causing hypoplasia and/or hypocalcification (opacity), mainly in the primary dentition (PINKHAM, 1996).

Tooth enamel is a tissue sensitive to environmental aggressions (SHAFER, 1987). Since the formation of its matrix, and later its mineralization, occurs over a prolonged period of time, several authors agree that systemic disorders during pregnancy and in a child's early life may be related to the generalized development of defects in dental enamel.

The hypothesis of this research was based on the principle that premature infants should have a higher prevalence of enamel defects in the form of hypoplasia and hypocalcification. In fact, within the methodology used, the hypothesis was confirmed, since 43% of preterm infants showed changes in the enamel being hypocalcification the most common, accounting for 56%. Thus, the data obtained in the study population corroborate those described by most authors who also assessed the prevalence of enamel defects in children born prematurely.

The highest occurrence of the dental elements involved 61 and 51, confirming the preferential localization in the anterior maxilla area (LIMA; DUARTE, 2000).

Pinkham (1996) argues that the trauma caused by laryngoscopy and endotracheal intubation in a critical period of amelogenesis contributes to defects in primary dentition of these infants, which is already compromised by disorders of calcium metabolism.

For Macedo et al. (2003), it is increasingly difficult to establish a positive correlation between intubation and enamel defects, since this procedure is used in situations of extreme severity. Probably associated with local trauma, systemic factors act together, causing disorder in the

development of the enamel, making it impossible to identify the factor most strongly related to the defects.

Relations between low weight, height and gestational age with increasing prevalence of disturbances in the enamel have been established by some authors as Funakoshi et al. (1981), Johnsen et al. (1984), Lima and Duarte (2000) and Lunardelli and Peres (2006), but our research has found no significant differences between the values of subjects with enamel disorders of those recruited in total.

Some aspects assessed in this research and its relation to changes in the enamel, such as maternal illness, medications used by pregnant women and therapies for newborns suggests that further studies within this line of research should be conducted to make this association relevant.

The presence of enamel defects was identified as a factor that predisposes the accumulation of biofilm, therefore to the colonization of cariogenic bacteria, but hypocalcification and hypoplasia of dental enamel do not turn out to be decisive for the development of dental caries, except if associated with inadequate social and behavioral factors, being able to contribute to the progression of caries.

As a result, the clinical relevance of this study suggests a closer follow up of children born prematurely, reinforcing the need for a preventive attitude in order to reduce the disease risk factors, from the prenatal and pediatric appointments and in work in conjunction with dentistry in an interdisciplinary approach.

Conclusion

According to what was researched, one can conclude that:

- 1) The premature birth factor had a positive influence in the occurrence of enamel defects of about 39%.
- 2) The enamel defects more associated with preterm birth were hypocalcification with 56% (more frequent) and hypoplasia (44%).

Acknowledgments

To the Head of General Dentistry Dr. Paulo Guberfain, to the Head of the Clinic Dr. Victor Abreu, Dr. Estela and pediatricians and Maria Helena, Glória and Rui, who provided assistance and cooperation necessary to complete this study.

References

BHASKAR, S. N. **Histologia e embriologia oral de orban**. 10. ed. São Paulo: Artes Médicas, 1989.

CAIXETA, F. F. et al. Os defeitos do esmalte e a erupção dentária em crianças prematuras. **Revista da Associação Médica Brasileira**, São Paulo, v.51, n.4, p.195-199, 2005.

FERREIRA, E. M *et al.* Intubação orotraqueal em bebê prematuro; complicações bucais e dentárias. **RGO**, v.4, n.51, p.341-34, 2003

- FERRINI, F. R. O.; MARBA, S. T. M.; GAVIÃO, M. B. D. Alterações bucais em crianças prematuras e com baixo peso ao nascer. **Revista Paulista de Pediatria**, São Paulo, v.25, n.1, p.66-71, 2007
- FUNAKOSHI, Y.; KUSHIDA, Y.; HIEDA, T. Dental observations of low birth weight infants. **Pediatric Dentistry**, v.3, n.1, p.21-25, 1981
- HOFFMANN, R. H. S. *et al.* Prevalência de defeitos de esmalte e sua relação com cárie dentária nas dentições decídua e permanente, Indaiatuba, São Paulo, Brasil. **Caderno de Saúde Pública**, Rio de Janeiro, v.23, n.2, p.435-444, 2007.
- JOHNSEN, D. *et al.* Distribution of Enamel Defects and the Association with Respiratory Distress in Very Low Birthweight Infants. **Journal of Dentistry Research**, v.63, n.1, p.59-64, 1984.
- LIMA, M. G. G. C.; DUARTE, R. C. **Prevalência dos defeitos do esmalte em crianças com baixo peso ao nascer na faixa etária de 06 a 72 meses na grande João Pessoa**. Curitiba: Editora Maio, 1999/2000. CD-ROM.
- LUNARDELLI, S. E.; PERES, M. A. Breast-feeding and other mother-child factors associated with developmental enamel defects in the primary teeth of brazilian children. **Journal of Dentistry for Children**, v.73, n.2, p.70-78, 2006.
- MACEDO, L. A. *et al.* **Defeitos de esmalte em dentes decíduos e permanentes em crianças prematuras e em crianças entubadas**. Available at: www.propp.ufu.br/revistaeletronica/vida2003/defeitos.pdf. Access in: 10 out. 2010
- MACHADO, F. C.; RIBEIRO, R. A. Defeitos de esmalte e cárie dentária em crianças prematuras e/ou de baixo peso ao nascimento. **Pesquisa Brasileira em Odontopediatria Clínica Integrada**, João Pessoa, v.4, n.3, p.243-247, 2004.
- PINKHAM, J. R. **Odontopediatria da infância à adolescência**. 2. ed. São Paulo: Artes Médicas, 1996.
- SHAFER, W. G.; HINE, M. K.; LEVY, B. M. **Tratado de patologia bucal**. 4. ed. Rio de Janeiro: Guanabara Koogan, 1987.
- SEGATTO, C.; ANAUATE, G.; BUSCATO, M. No frágil mundo dos prematuros. **Época**, São Paulo. 21 jul. 2008. Saúde e Bem-Estar, p.104-112.
- SEOW, W. K. Effects of preterm birth on oral growth and development, **Australian Dental Journal**, v.42, n.2, p.85-91, 1997