ISSN: 1812–1217

The Effect of Premature Birth on The Primary Dentition

Ghada Dh Al – Sayagh
BDS, MSc (Lect)

Aisha A. Qasim
BDS, MSc (Lect)

Baydaa A Al – Rawi
BDS, MSc (Assist Lect)

Dept of Pedod, orthod, and Prev Dentistry
College of Dentistry, University of Mosul

ABSTRACT

Aims: The aims of the present study were to determine if primary teeth eruption and the presence of enamel defect are affected by low birth weight and prematurely of birth. **Materials and Methods:** The total subjects of (420) child aged 4 – 24 months were included in this study, consisted of (210) prematurely born (<37 gestational weeks and birth weight < 2.500 Kg) children and 210 control children (≥40 gestational weeks and birth weight ≥ 2.500 Kg). Those children selected randomly the children who came to the primary health care centers with their mother for vaccination and the mothers asked to participate in this study. For each child, clinical exanimation was performed in dental chair. The criterion used for enamel defect to include various enamel hypoplasias, deficiency of enamel in the form of pits, grooves or other quantitative surface loss and enamel hypocalcifications and opacities. Data were analyzed using numbers, percentages, means and standard deviations. T – test, Z – test Chi – square (X^2) test were used for determining the differences concerning different variables. The differences were considered significant at $p \leq 0.05$. **Results:** There was no significant difference ($p>0.05$) between different genders numbers among in each age group for the preterm and control children. The results showed significantly ($p<0.05$) delayed eruption of the primary teeth in the prematurely born children as compared with the control children in all age groups except in 4 – 6 months age group, also there was significantly higher percentages of enamel defect present in preterm children, than in control children in all age groups except in 4 – 6 months age group. **Conclusions:** The findings indicated that the eruption of deciduous teeth was delayed and the percentage of enamel defect was significantly increased in prematurely born children.

Key Words: Premature birth, primary dentition.

Al – Sayagh G Dh, Qasim AA, Al – Rawi BA. The effect of premature birth on the primary dentition *Al–Rafidain Dent J*. 2008; 8(1):18 –22.
Received: 4/12/2006 ***Sent to Referees:*** 4/12/2006 ***Accepted for Publication:*** 11/4/2007

INTRODUCTION

Prematurely born infants have a short prenatal development period and predisposed to various neonatal complications and developmental problems. According to the World Health Organization definition, a delivery is preterm when it occurs before the 37th completed week of pregnancy and the prematurity had been defined by birth weight under 2500 grams [1].

Many aetiological factors for premature birth exist, many of which are associated with the maternal and foetal diseases, but often the cause remains obscure. There are several systemic derangements that can interfere with the developing teeth, especially teeth that are at a critical stage of development at the time of the insult and not calcified or dimensionally complete at the time of birth [2].

Various theories have been put forward to explain the tooth eruption process, which is still largely unknown. Root growth, dentine formation, proliferation of the dental pulp, the periodontal ligament, the connection between the enamel organ and the oral epithelium and the role of the dental follicle, including its innervation and blood supply, are considered to be essential [3, 4].

Studies of preterm children have shown that the developing dentition may be affected at a time of an exceptionally early delivery. The prevalence of enamel defects in the deciduous [5,6] and permanent dentition [7] has been reported to be higher in premature infants.

Different studies found that hypomineralization of the teeth has been thought to be associated with the systemic derangements of preterm birth such as nutritional problems [8], neonatal infections[9] and metabolic disorders[10]. While dental defects arising from local causes tend to affect only single teeth or groups of teeth. Local traumatic factors associated with endotracheal intubation and laryngoscopy during a critical period of tooth amelogenesis may also contribute to dental defects in the deciduous dentition. A close correlation exists between birth weight, dental defects and the intubation period, the prevalence of dental defects generally increasing with a longer period of orotracheal intubation [7, 11, 12].

The purposes of the present study were to determine if the primary teeth eruption and the presence of enamel defect are affected by low birth weight and prematurely of birth.

MATERIALS AND METHODS

The total subjects of (420) child aged 4 – 24 months were included in this study, consisted of (210) prematurely born (< 37 gestational weeks and birth weight < 2.500 Kg) children and (210) control children (≥ 40 gestational weeks and birth weight ≥ 2.500 Kg), those children selected randomly from children who came to the primary health care centers with their mothers for vaccination and the mothers were asked to participate in this study. None of the mothers refused to answer the questionnaire form which was applied by face – to – face interview technique. The questions clarify to the gestation period and birth weight of the child.

For each child, clinical exanimation was performed on dental chair. In each clinical examination, gauze pads were used to clean and dry the tooth surface. The examination was conducted with a visual and non tactile technique; this method is known as "lift the lip" technique. No dental probing was performed on these children and the mouth mirror was used for indirect vision in lingual areas of the teeth [13]. All cases of enamel defects with family history were excluded from this study.

The criterion used for the enamel defect include various enamel hypoplasias, deficiency of enamel in the form of pits, grooves or other quantitative surface loss and enamel hypocalcifications and opacities, i.e. qualitative changes in the translucency of the enamel without loss of the enamel surface in the form of stained or white opaque flecks[14].

Data were analyzed using numbers, percentages, means and standard deviations. T – test was used to determine the differences in the means of teeth present per child in preterm and control groups. Z – test between two proportions was used for determining the differences in the enamel defect present in preterm and control groups for each group. Chi – square (X2) test was used for determining the gender differences for each group. The differences were considered significant at $p \leq 0.05$.

RESULTS

The total subjects of (420) child aged 4 – 24 months were included in this study, consisted of (210) prematurely born children (103 males and 107 females) and (210) control children (102 males and 108 females). The number of children (males, females and total sample), were distributed according to the age groups are shown in Table (1). There was no significant difference (p>0.05) between different genders numbers among in each age group for the preterm and control children.

The number of teeth present in addition to the means and standard deviations of teeth present per child in each age group of preterm and control children were illustrated in Table (2). The results showed significantly (p<0.05) delayed eruption of the primary teeth in the prematurely born children as compared with the control children in all age groups except in 4 – 6 months age group.

Table (1): Numbers of children in each age group distributed according to the birth weight and gender of preterm and control groups.

Age groups (Months)	Body weight at birth <2.500 Kg			Body weight at birth ≥ 2.500 Kg		
	Male	Female	Total	Male	Female	Total
4 – 6	10	12	22	10	12	22
7 – 9	19	11	30	13	17	30
10 – 12	12	15	27	13	14	27
13 – 15	20	17	37	19	18	37
16 – 18	15	19	34	17	17	34
19 – 21	16	16	32	17	15	32
22 – 24	11	17	28	10	18	28
Total	103	107	210	102	108	210

Table (2): Means and standard deviations of teeth present per infant in each age group of preterm and control groups

Age groups (Months)	Body weight at birth< 2.500 Kg			Body weight at birth≥ 2.500 Kg			T - value	P - value
	No. Infants	No. teeth	Mean ± SD teeth present / infant	No. Infants	No. teeth	Mean ± SD teeth present / infant		
4 – 6	22	3	0.00 ± 0.00	22	34	1.55 ± 0.51	0.00	NS
7 – 9	30	40	1.33 ± 0.48	30	79	2.63 ± 0.45	4.66	<0.001
10 – 12	27	61	2.26 ± 0.45	27	118	4.37 ± 0.33	7.80	<0.001
13 – 15	37	125	3.38 ± 0.79	37	274	7.41 ± 0.53	9.23	<0.001
16 – 18	34	180	5.29 ± 0.96	34	351	10.32 ± 0.91	13.55	<0.001
19 – 21	32	268	6.17 ± 1.08	32	427	13.34 ± 0.40	13.79	<0.001
22 – 24	28	377	13.46 ±0.65	28	496	17.71 ± 0.46	8.38	<0.001
Total	210	1051	5.00 ± 0.07	210	1779	8.47 ± 1.16	23.30	<0.001

Significant difference at P< 0.05

Concerning the enamel defect, the percentage of enamel defect present in each age group for preterm and control children were demonstrated in Table (3). The results showed significantly higher percentages of enamel defect present in preterm children than in control children in all age groups except in 4 – 6 months age group.

Table (3): The percentage of dental defect present in each age group according to the birth weight.

Age groups (Months)	Body weight at birth < 2.500 Kg			Body weight at birth≥ 2.500 Kg			Z - value	P - value
	No. Teeth present	No. of teeth with enamel defect	% enamel defect	No. teeth present	No. of teeth with enamel defect	% enamel defect		
4 – 6	3	0	0.00	34	0	0.00	0.00	NS
7 – 9	40	12	30.00	79	0	0.00	5.13	< 0.001
10 – 12	61	47	77.05	118	7	5.93	9.83	< 0.001
13 – 15	125	68	54.40	274	8	2.92	12.15	< 0.001
16 – 18	180	83	46.11	351	11	3.13	12.28	< 0.001
19 – 21	268	184	68.66	427	12	2.81	18.78	< 0.001
22 – 24	377	202	53.58	496	14	2.82	17.22	< 0.001
Total	1051	596	56.71	1779	52	2.92	32.90	< 0.001

NS = Non significant difference at P> 0.05; Significant difference at P< 0.05

DISCUSSION

Both genetic and environmental factors acting during odontogenesis are associated with the tooth eruption process. The environment, prenatal and maternal factors, social factors, nutrition, socio–economic status, climate may influence the timing of tooth eruption[15 - 17], although the eruption of teeth includes local controlling factors such as crowding and premature or delayed loss of deciduous teeth. The chronology of the eruption of the deciduous teeth is thought to be more extensively genetically determined than in the case of the permanent teeth[18].

In the present study significantly delayed eruption of the primary teeth in the prematurely born children as compared with the control children in most age groups, these results were in agreement with other studies [18 - 20], who found an association between birthweight and tooth eruption and has been suggested by children who are heavier at birth experiencing to have teeth eruption significantly earlier. Meanwhile, other found that the degree of prematurity significantly affects timing of primary tooth eruption [21].

The results of the present study showed significantly higher percentages of enamel defect (hypoplasia and hypocalcification) present in pretmature children than in control children in most age groups. These results were in agreement with the findings of other studies which some of them hypothesized that metabolic derangements in the prenatal and postnatal periods affect the mineralization of teeth [11 - 13], while other studies discussed the possible pathogenesis of the dental defects associated with the premature birth may be related to the direct damage to the ameloblasts as in maternal infections (rubella, cytomegalovirus)[22], or complications of the pregnancy that reduce the maternal serum calcium concentrations like diabetes, hyperparathyroidism and maternal calcium and vitamin D deficiencies, while various complications associated with prematurity predispose these infants to severe metabolic derangements, and these conditions may result in disturbed enamel formation. The problem of deranged calcium metabolism occurs to varying degrees in most premature infants, because two-thirds of the individual's stores of calcium and phosphorus accumulate during the last trimester of pregnancy and preterm infants miss much of this mineral accretion[23].

CONCLUSIONS

The findings indicate that the eruption of deciduous teeth was significantly delayed and the percentage of enamel defect was also significantly increased in prematurely born children.

REFERENCES

1. Cartlidge PHT and Stewart JH. Survival of very low birthweight and very preterm infants in a geographically defined population. *Acta Paediatr*. 1997; 86:105–10.
2. Hack M and Fanaroff AA. Outcomes of children of extremely low birthweight and gestational age in the 1990's. *Semin Neonatol.* 2000; 5:89–106.
3. Cahill DR and Marks SC. Tooth eruption: evidence for the central role of the dental follicle. *J Oral Pathol*. 1980; 9:189–200.
4. Sutton RN and Graze HR. The blood vessel thrust theory of tooth eruption and migration. *Med Hypotheses*. 1985; 18:289–295.
5. Seow WK. A study of the development of the permanent dentition in very low birthweight children. *Pediatr Dent*. 1996; 18(5):379–84.
6. Seow WK. Effects of preterm birth on oral growth and development. *Aust Dent J.* 1997; 42: (2):85–91.
7. Aine L, Backström MC, Mäki R, Kuusela A-L, Koivisto AM, Ikonen RS and Mäki M. Enamel defects in primary and permanent teeth of children born prematurely. *J Oral Pathol Med*. 2000; 29:403–9.
8. Seow WK, Brown JP, Tudehope DA and O'Callaghan M. Dental defects in the deciduous dentition of premature infants with low birthweight and neonatal rickets. *Pediatr Dent*. 1984; 6(2):88–92.
9. Funakoshi Y, Kushida Y and Hieda T. Dental observations of low birth weight infants. *Pediatr Dent*. 1981; 3(1):21–25.
10. Fearne JM, Bryan EM, Elliman AM, Brook AH and Williams DM. Enamel

defects in the primary dentition of children born weighing less than 2000g. *Br Dent J*. 1990; 168(11):433–7.
11. Fadavi S, Adeni S, Dziedzic K, Punwani I and Vidyasagar D. The oral effects of orotracheal intubation in prematurely born preschoolers. *J Dent Child.* 1992; 6: 420–424.
12. Noren JG, Ranggård L, Klingberg G and Persson C. Intubation and mineralization disturbances in the enamel of primary teeth. *Acta Odontol Scand*. 1993; 51:271–275.
13. Vachirarojpisan T, Shinada K, Kawaguchi Y, Laungwechakan P, Smokote T, Detsomboonrate P. Early childhood caries in children aged 6 – 19 months. *Community Dent Oral Epidemiol.* 2004; 32: 133– 142.
14. Federation Dentaire Internationale Commission on Oral Health, Research and Epidemiology: A review of developmental defects of enamel (DDE) index. *Int Dent J*. 1992; 42: 411 – 412.
15. Nanda RS. Eruption of human teeth. *Am J Orthod*. 1960; 46:363–378.
16. Rantakallio P and Mäkinen H. The effect of maternal smoking on the timing of deciduous tooth eruption. *Growth*. 1983; 47:122–128.
17. Heikkinen T, Alvesalo L, Osborne RH and Sarpola A. Clinical eruption of permanent incisors and first molars after maternal smoking in pregnancy. *Acta Med Auxol*. 1995; 27(2-3):83–96.
18. Backström MC, Aine L, Mäki R, Kuusela AL, Sievänen H, Koivisto AM, Ikonen RS and Mäki M. Maturation of primary and permanent teeth in preterm infants. *Arch Dis Child Fetal Neonatal Ed*. 2000; 83(2):104–108.
19. Bailit HL, Niswander JD and MacLean CJ. The relationship among several prenatal factors and variation in the permanent dentition in Japanese children. *Growth*. 1968; 32:331–345.
20. Bailit HL and Sung B. Maternal effects on the developing dentition. *Arch Oral Biol*. 1968; 13:155–162.
21. Viscardi RM, Romberg E and Abrams RG. Delayed primary tooth eruption in premature infants: relationship to neonatal factors. *Pediatr Dent*. 1994; 16(1):23–28.
22. Seow WK. Oral complications of premature birth. *Aust Dent J*. 1986; 31(1):23–29.
23. Tsang RC, Donovan EF and Steichen JJ. Calcium physiology and pathology in the neonate. *Pediatr Clin N Am.* 1976; 23:611–626.