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Dental eruption in low birth-weight prematurely born children: a controlled study

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Abstract

This study compared the dental eruption status of a group of prematurely born, very low birth-weight (VLBW, < 1500 g) children with a group of low birth-weight (LBW, 1500-2500 g) as well as a group of normal birth-weight (NBW, > 2500 g) children in order to determine if dental eruption is affected by low birth weight and prematurity of birth. Data were analyzed using chronological and corrected (true biological) ages of the prematurely born group. The results show that when chronological ages of the children were used, VLBW children have significant retardation of dental eruption compared with LBW and NBW children, particularly before 24 months of age (P < 0.01). However, when corrected ages of the VLBW children were used, there was no significant difference detected, indicating that the "delay" in dental eruption may be simply due to their early birth.

Several studies on the growth and development of low birth-weight, prematurely born children have indicated that although physical growth disturbances may be present for some time after birth, catch-up growth usually occurs by early childhood (Fitzharding 1976). However, although the physical development of prematurely born children has been well investigated, there are relatively few studies on the dental development of these children. Our previous investigations supported others, showing a high prevalence of enamel defects of about 20-100%.[1]

It is not certain whether dental eruption is affected by prematurity of birth and low birth weight. Early studies were in disagreement as to whether low birth-weight children had delayed eruption (Tsubone 1962; Wedgewood and Holt 1968). Two later investigations suggested that teething age of the first tooth was delayed in prematurely born children, but eruption of other teeth was not studied (Trupkin 1974; Golden et al. 1981). The present study was designed to detect differences in the tooth eruption status of prematurely born, very low birth-weight (VLBW, < 1500 g) children compared to low birth-weight (LBW, 1500-2500 g), and normal birth-weight (NBW, > 2500 g) children in order to determine if dental eruption is affected by low birth weight and prematurity of birth.

[1] Grahnen and Larsson 1958; Mellander 1982; Johnsen 1984; Seow et al. 1984a, 1984b, 1987.

Patients and Methods

The VLBW children were those attending the Growth and Development Clinic of the Mater Children's Hospital, South Brisbane. This clinic provides a multidisciplinary, longitudinal follow-up of all infants of very low birth weight managed at the Mater Mother's Hospital. Children in the LBW group and the NBW group were born at the same time period as the VLBW group. They were selected at random from the birth register of the hospital. Parent consent to participate in the study was given by > 97% of the patients we were able to contact. There were 153 total subjects and 97% were of Caucasian birth with three per cent part-Caucasian.

Table 1 (next page)shows the characteristics of the patients in the study. In the VLBW group, 73 children (30 males, 43 females) were available for study. Their mean gestational age was 29.4 ± 2.5 weeks (range 24-33 weeks) and their mean birth weight was 1179 ± 193 g (range 783-1499 g).

In the LBW group (1500-2499 g) there were 33 patients (14 males, 19 females). Their mean gestational age was 37.4 ± 3.1 weeks (range 32-41 weeks) and their mean birth weight was 2176 g ± 273 g (range 1577-2480 g).

In the NBW group (> 2500 g), 47 children (22 males, 25 females) were available for study. They were all born full term and their mean birth weight was 3360 ± 450 g (range 2510-4045 g).

The ages of the children at the time of dental examination varied from 24.3 ± 1.2 months in the VLBW group

TABLE 1. Some Characteristics of the Children in the Three Birth-weight Groups

Group	Birth Weight (g)	Gestational Age (wk)	Age at Examination*	
			Chronological Age (mo)	Corrected Age (mo)
VLBW (N = 73)	1179 ± 193	29.4 ± 2.5	24.3 ± 1.2	21.8 ± 1.2
LBW (N = 33)	2176 273	38.4 3.1	25.5 1.8	25.2 1.8
NBW (N = 47)	3360 ± 450	40.0 ± 2.0	30.3 ± 1.5	30.3 ± 1.5

* Chronological age indicates true age whereas corrected age indicates chronological age adjusted for the prematurity of birth, i.e., corrected age = chronological age − (weeks of prematurity).

to 30.3 ± 1.5 months in the NBW group. This variability in the age at examination is due to the fact that the examinations were extended over a period of time. The corrected age of each child was computed from the chronological (true biological) age using the following formula: corrected age equals chronological age minus weeks of prematurity.

The dental examinations were performed at the University of Queensland Dental School. All erupted teeth were recorded in a comprehensive chart. A tooth was considered erupted if any part of its crown had penetrated the mucous membrane. Other abnormalities of the dentition also were noted. Intraoral photographs were taken in some children. Postnatal medical and dental histories were obtained from the parents. Maternal and neonatal medical histories were obtained from hospital records.

It was noted from the histories that no child in the study had had dental extractions or tooth loss from trauma prior to the time of examination.

As the study was cross-sectional and not relating to sequence, timing of eruption was not studied. Instead, the number of teeth present in each subject was noted with reference to age at the time of dental examination.

Data were coded, computerized, and analyzed using analysis of variance (ANOVA) tests to detect statistical differences between groups.

Results

In this cross-sectional study, it was necessary to divide the children into various age groups of 6-11 months, 12-17 months, 18-23 months, and 24+ months. This division was necessary because the children were examined at different times and it was pertinent to determine whether at any particular age group, a low birth-weight child had significantly fewer numbers of teeth compared to the child with normal birth weight. These age groups of five-monthly intervals were chosen to include approximately the mean eruption times of the primary incisors, first molars, canines, and second molars, respectively.

Chronological Age

Table 2 shows the mean number of teeth present in each age group of children within each individual birth-weight group, using the chronological ages of the children. As can be seen from the table, in the age groups 6-11 months and 12-17 months, the VLBW children had fewer numbers of teeth compared to the LBW and the NBW children. A two-way ANOVA for the number of teeth for the three birth-weight groups and the four age groups showed a significant interaction between chronological age and birth weight (Table 3), indicating that the lower the birth weight, the fewer the teeth present ($P < 0.01$). However, by 18 months, the differences in the number of teeth in the three birth-weight groups were not evident ($P > 0.1$).

Corrected Age

As prematurely born children are not fully mature at the time of birth, their chronological ages do not correspond to their true biological ages. Hence, a meaningful comparison with full-term, normal children can only be made if the ages of prematurely born children are corrected for the early births.

Table 4 shows the mean number of teeth present in each age group of children within each individual birth-weight group using the corrected ages of the children. In contrast to the results using chronological ages of children, a two-way ANOVA for the number of teeth for the three birth-weight groups and the four age groups showed a nonsignificant interaction between corrected age and birth weight (Table 5).

Disussion

Various general factors have been suggested to influence dental eruption in the healthy child. These include race, sex, and physical development (Falkner 1957; Friedlaender and Bailit 1969). Because prematurity of birth and low birth weight may influence general physical development, it is likely that dental development may be similarly affected, but few studies have addressed this issue. Most of these previous studies were uncontrolled and usually only the eruption time of a

TABLE 2. Mean Number of Teeth Present in Each Age Group (Chronological Age) Within Each Birth-Weight Group

Age Group (mo)	Mean No. of Teeth (±SE)		
	VLBW	LBW	NBW
6-11	1.0 ± 1.3	3.7 ± 1.4	3.0 ± 1.8
12-17	6.6 0.6	8.0 1.3	11.8 1.0
18-23	14.0 0.6	15.5 0.8	14.8 0.8
24+	18.7 ± 0.4	19.0 ± 0.6	18.4 ± 0.5

A two-way analysis of variance for the number of teeth for the three birth-weight and four age groups showed a significant interaction between chronological age and birth weight (Table 3).

TABLE 3. Analysis of Variance for Number of Teeth Present in the Three Birth-weight Groups of Children Using Chronological Ages

Source of Variation	*Degrees of Freedom*	*Sum of Squares*	*Mean Square*	*Variance Ratio*	*P Value*
Age group	3	3637.9	1212.6	404.2	0.001
Birth-weight group	2	40.0	20.2	3.2	<0.05
Age × birth-weight interaction	6	110.7	18.5	2.95	<0.01
Residual	141	882.6	6.3		

The analysis of variance of number of teeth showed a significant interaction between chronological age and birth weight ($S_{6,141} = 2.95$, $P < 0.01$).

single tooth was recorded.

Our present controlled study found that VLBW children have fewer teeth present compared to LBW and NBW children when examined at their chronological ages of 6-17 months, indicating that they have retarded dental eruption at these ages. However, after 17 months this difference is no longer evident, most probably resulting from catch-up growth of the dental and alveolar structures. In relation to this finding is the fact that catch-up growth of general body size also has been documented to occur in the low birth-weight, prematurely born child so that by late childhood, most of these children are comparable in weight and height to their normal birth-weight peers (Neligan et al. 1976; Fitzharding 1976).

However, our results also indicate that if corrected rather than chronological ages are used in the analysis of data, there are no significant differences in the mean numbers of teeth in the three birth-weight groups. This is the case for all the age groups examined. This may indicate that low birth-weight children may be "delayed" in their dental eruption simply because of their birth prematurity per se, and not through delayed dental development. It can be suggested that the degree of prematurity, i.e., 40 weeks minus gestational age, be taken into account when estimating the eruption times of prematurely born children.

The results of the present study thus confirm and extend that of previous investigators which found that the eruption of the first tooth was delayed in prematurely born children (Trupkin 1974; Golden et al. 1981). Also, we did not find any differences in the mean numbers of teeth between the sexes, confirming the results of several other investigators (Falkner 1957; Roche et al. 1964). In addition, our data for NBW children agree with that of a study of primary tooth eruption in Australian children (Roche et al. 1964).

Knowledge of normal estimated eruption times of teeth is of clinical importance for accurate diagnosis of various local and systemic conditions that may affect dental eruption. These conditions include supernumerary teeth, impacted teeth, cysts, and tumors which may cause local delayed eruption. On the other hand, systemic causes of altered eruption include endocrine disturbances, e.g., hypothyroidism which results in delayed eruption and precocious puberty in which accelerated eruption is observed (Steward and Poole 1982). In addition, in various abnormalities of the bone there is altered dental eruption. These conditions include cleidocranial dysostosis and Albright hereditary osteodystrophy, both of which show delayed eruption (Miller et al. 1976; Steward and Poole 1982).

Hence, the results of the present study are of clinical significance in that prematurely born children should have their early births taken into account when estimating times for eruption of their dentition.

TABLE 4. Mean Number of Teeth Present in Each Age Group (Corrected Age) Within Each Birth-weight Group

Age Group (mo)	*Mean No. of Teeth (±SE)*		
	VLBW	*LBW*	*NBW*
6–11	3.7 ± 0.78	5.0 ± 1.2	3.0 ± 1.8
12–17	9.6 0.7	9.0 1.8	11.8 1.1
18–23	14.1 0.6	15.5 0.8	14.8 0.8
24+	19.0 ± 0.5	14.8 ± 0.8	18.4 ± 0.5

A two-way analysis of variance for the number of teeth for the three birth-weight and four age groups revealed no significant interaction between corrected age and birth weight (Table 5).

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TABLE 5. Analysis of Variance for Number of Teeth Present in the Three Birth-weight Groups of Children Using Corrected Ages

Source of Variation	*Degrees of Freedom*	*Sum of Squares*	*Mean Square*	*Variance Ratio*	*P Value*
Age group	3	3626.4	1215.3	176.1	<0.001
Birth-weight group	2	6.5	3.3	0.5	>0.1
Age × birth-weight interaction	6	39.6	6.6	1.0	>0.1
Residual	140	956.0	6.9		

The analysis of variance of number of teeth showed no significant interaction between corrected age and birth weight ($S_{6,141} = 0.97$, $P > 0.1$).

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Patients prefer women doctors

Female physicians were preferred over males by both male and female hospital patients a recent survey shows.

At a study done at the University of Connecticut Health Center, patients were asked to rate the performance of 27 interns in 14 general areas including courtesy, bedside manner, and availability. Comforting skills and attitudes toward patients were considered the most important — especially by women. A physician's technical and interpersonal skills were ranked as equally important. The study also showed that older patients were consistently more satisfied than younger ones and dissatisfaction increased among patients with higher education.

Female doctors now comprise 14% of the physicians in the country and one-third of all medical students and one-fourth of residents are women.

Data from the American Medical Association show that women physicians typically practice in salaried positions or earn less in private practice than men. They see fewer and younger patients and spend more time with each one; they also see more women patients, are sued less often, and are less involved in organized medicine.