

# Baby bottle tooth decay and complications during pregnancy and delivery

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## Abstract

The purpose of the study was to investigate an association between maternal and/or fetal complications during pregnancy and/or delivery and the occurrence of baby bottle tooth decay (BBTD) in the infant. The study population comprised 50 mothers of infants with BBTD (BBTD+ mothers); 50 mothers of aged-matched children with similar eating and bottle-use habits but without BBTD (BBTD-) served as comparisons. Interviews with the mothers focused on pregnancy complications (vaginal bleeding, premature uterine contractions, viral or bacterial infections, hospitalization, diabetes, or other causes of high-risk pregnancy), mode of delivery (normal or instrumental), fetal distress, gestational age, birth weight, and mother's age at delivery. Chi-square analysis and the Student's *t*-test were used to analyze the data. Pregnancy complications and instrument delivery/cesarean section were significantly higher in the BBTD+ group than in the controls ( $P = 0.0001$  and  $P = 0.0004$ , respectively). In the BBTD+ group, vaginal bleeding/premature uterine contractions were most frequent (50%), while in the BBTD- group, high-risk pregnancy dominated (20%). Normal deliveries were more frequent in the BBTD+ mothers (68%) than in the comparisons (40%). Gestational age and baby's birth weight did not differ between the two groups. The mean age of the BBTD+ mothers was significantly lower than that of the controls ( $P = 0.013$ ). The results suggest that babies born after maternal complications during pregnancy or babies who experience a traumatic birth must be considered to be at risk of developing BBTD when exposed to excessive bottle nursing. (*Pediatr Dent* 19:34–36, 1997)

**B**aby bottle tooth decay (BBTD) and nursing caries are terms used to describe a form of caries of the primary dentition originating from prolonged use of bottle feeding with fermentable carbohydrate liquids or milk.<sup>1</sup> The decay first attacks the maxillary incisors, spreading to the maxillary molars, mandibular molars, and, rarely, to the mandibular incisors. It has been postulated that this pattern of caries is related to 1) the chronology of primary tooth eruption, 2) the duration of the deleterious habit, and 3) the muscular pattern of infant sucking.<sup>2</sup>

The association between BBTD and cultural or gen-

eral habits of baby feeding, such as using the bottle as a pacifier and sleeping with the bottle overnight or during naps is well established.<sup>1,3,4</sup> Still, clinicians have the impression that habitual bottle use by siblings of an affected child does not necessarily result in similar ill dental effects.<sup>5</sup> This phenomenon implies that factors other than environmental or cultural-behavioral influences render certain teeth vulnerable to BBTD, such as the presence of *Streptococcus mutans*.

Enamel formation of the primary incisors begins at 11 to 14 weeks of fetal life and is completed by the end of the third postnatal month.<sup>6,7</sup> The initial phase consists of matrix formation, followed by calcification in utero. Since enamel is a relatively stable structure, defects involving its matrix secretion and/or maturation of the primary incisors can act as a permanent record of insults occurring pre- or perinatally. A wide range of conditions may contribute to these hypoplastic/hypomineralized dental defects. Systemic maternal disorders associated with enamel hypoplasia of the dentition of the fetus/neonate include diabetes, kidney disease, and viral or bacterial infection. For the neonate, premature birth, rh incompatibility, allergies, gastroenteritis, malnutrition, infectious diseases, and chronic diarrhea all have been implicated.<sup>8–13</sup> Every delivery actually leaves a mark on the teeth developing at that time, in the form of the neonatal line. A common factor in all these conditions—both maternal and fetal/neonatal—may be transient hypocalcemia.<sup>14</sup>

A possible correlation between hypoplastic defects and nursing caries was proposed three decades ago.<sup>15,16</sup> However, hypoplastic dental defects are sometimes difficult to distinguish from caries that results from excessive bottle nursing, especially when the caries is secondary to the defect.<sup>1</sup> Some authors maintain that linear enamel hypoplasia is a predisposing factor to dental caries.<sup>14</sup>

This paper is a pilot study investigating an association between maternal and/or fetal complications during pregnancy/delivery and the occurrence of BBTD in the infant.

## Materials and methods

The study population comprised 50 mothers of normal children with BBTD (BBTD+ mothers) who pre-

sented at the pediatric dental clinic of the Hadassah Faculty of Dental Medicine in Jerusalem for dental examination. The children's ages ranged between 3 and 4 years. BBTD was diagnosed after clinical examination (carious involvement of at least three maxillary incisors on the buccal surface, irrespective of severity of the lesions) and confirmed by the children's eating and feeding habits,<sup>17</sup> which included falling asleep with the bottle containing sweetened liquid at night and in naps during the day, and having the bottle at will. A group of 50 mothers of health- and age-matched children who also presented for dental examination with similar eating and bottle-use habits but showing no BBTD (BBTD-mothers) served as a comparison. Medical and dental histories were taken in the examination interview including the course of the pregnancy and delivery. Special attention was paid to occurrence of vaginal bleeding, premature uterine contractions, episodes of viral or bacterial infection, hospitalization (during pregnancy), diabetes, and other causes of high-risk pregnancy not necessitating hospitalization (pregnancy complications). Note was made of the mode of delivery, i.e., normal, instrumental (vacuum or forceps) or cesar-

ean section (CS). The presence of fetal distress, gestational age, and birth weight of the baby, as well as the mother's age at delivery were also recorded.

## Statistical analysis

Chi-square analysis was performed for comparison of BBTD+ and BBTD- mothers with respect to maternal complications during pregnancy and complications at delivery. Comparison between the two study groups regarding the other variables (baby's birth weight, gestational age, and maternal age) was done using the Student's *t*-test.

## Results

Complications during pregnancy and delivery were more prevalent in the BBTD+ group (Table 1), vaginal bleeding/premature uterine contractions being the most frequent (50%) disorders. In the comparison group, the prevailing problem was high-risk pregnancy (20%). Fetal distress during delivery was reported more often among the BBTD+ mothers (28%) than the comparisons (16%). Normal deliveries were more frequent in the BBTD- group (68%) than among the BBTD+ (40%) mothers (Table 1). Both pregnancy complications and instrumental delivery/CS were significantly higher among the BBTD+ mothers group ( $P = 0.0001$  and  $P = 0.0004$ , respectively) (Table 2). No statistically significant differences were found for gestational age at delivery and the baby's birth weight between the groups. On the other hand, the mean age of the BBTD+ mothers was significantly lower (Table 3).

## Discussion

The results indicate a strong association between the appearance of BBTD and a history of complications during pregnancy and/or at delivery. Each of the maternal complications recorded in the present study (Table 1), as well as traumatic fetal events (e.g., fetal distress, instrumental delivery) may cause temporary hypocalcemia in the fetus,<sup>14</sup> which eventually might be expressed in the neonate as disturbances in enamel formation. Teeth thus affected may be more susceptible to cariogenic insult. The hypoplastic lesions may be pronounced and clearly visible to the naked eye, appearing as defects in texture or as discolorations, forming an obvious basis for future dental caries. Even in sound primary teeth, the carious process progresses at a rapid pace,<sup>18</sup> which is enhanced in the case of hypoplastic enamel. However, the outcome of developmental disturbances (hypocalcification, hypoplasia) may be covert, constituting barely discernible opacities or other discolorations. Even such mildly affected enamel may very well be vulnerable to caries attack upon continuous and intensive exposure to cariogenic insult.<sup>19</sup>

TABLE 1. MATERNAL COMPLICATIONS DURING PREGNANCY AND DELIVERY

	BBTD+ (N = 50)		BBTD- (N = 50)	
	N	%	N	%
<i>During Pregnancy</i>				
Vaginal bleeding/premature uterine contractions	25	50	5	10
Bacterial/viral infection	19	38	8	16
Other causes of high-risk pregnancy	18	36	10	20
Hospitalization	16	32	0	0
Diabetes	7	14	1	2
<i>During Delivery</i>				
Normal	20	40	34	68
Fetal distress	14	28	8	16
Cesarean section	10	20	4	8
Instrumental: vacuum/forceps	6	12	4	8

TABLE 2. COMPARISON BETWEEN BBTD+ AND BBTD- MOTHERS WITH RESPECT TO COURSE OF PREGNANCY AND DELIVERY

	BBTD+		BBTD-		P-value
	N	%	N	%	
<i>Pregnancy</i>					
Complications	43	86	15	30	0.0001
No complications	7	14	35	70	
<i>Delivery</i>					
Instrumental or cesarean section	27	54	10	20	0.0004
Normal	23	46	40	80	
Total	50	100	50	100	

**TABLE 3. WEIGHT AND AGE PARAMETERS IN THE TWO STUDY GROUPS**

	BBTD+ (N = 50)	BBTD- (N = 50)
Gestational age at birth (weeks)	38.88 ± 2.41 (30–42)*	39.14 ± 2.28 (25–42)
Birth weight (kg)	3.26 ± 0.43 (2.2–4.5)	3.24 ± 0.38 (1.2–4)
Mother's age at delivery	29.42 ± 6.16 (19–45)	32.30 ± 5.34 (22–42) <sup>†</sup>

\*Numbers in parentheses designate the range.

<sup>†</sup> P = 0.013, Student's t-test.

In the majority of cases, delivery took place at term in both groups, and baby's birth weight was within the 10–90% percentile. The significance of the higher mean age of the BBTD- mothers is not clear. There is no cultural, ethnic, or social reason to explain this finding. It should be mentioned, however, that no record was made of the number of siblings of the participating infants (which might have had an effect on maternal complications during pregnancy).

Our investigation was designed as a pilot study, and as such, faces limitations. Neither of the two groups of 50 mothers (and infants) represents a broad spectrum population. The children of the comparison group have been matched for various factors, but they may have differed in that the BBTD- mothers may have valued prevention while BBTD+ mothers not. Also, some of the children in the comparison group may have been "BBTD waiting to happen" and simply not manifested the condition yet. Nevertheless, the results suggest that babies born after complications during pregnancy or who experience a traumatic birth are at a higher risk to develop BBTD when exposed to excessive bottle nursing than infants born after an uneventful pregnancy and delivery. Parental counseling for these parents during pregnancy may increase the awareness to the possible effect of intrauterine life on the quality of the infant's teeth. It may stimulate the proper use of infant bottle feeding and other modalities of caries prevention. A prospective study encompassing a large and more detailed stratified population of pregnant women is needed, enabling practitioners to pinpoint the infants at high risk of developing BBTD consequent to deleterious events in utero or at delivery.

## Conclusions

1. Pregnancy complications and instrumental delivery/cesarean section were prevalent in mothers to children with BBTD.
2. Babies born after maternal complications during pregnancy or babies who experience a traumatic birth must be considered to be at risk of developing BBTD when exposed to excessive bottle nursing.

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