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Influência dos fatores de risco infantis na cronologia de erupção da dentição decídua

| Influence of childhood risk factors on deciduous teeth eruption timing

RESUMO | Introdução: *O sincronismo da erupção corresponde ao período em que cada dente decíduo irrompe na cavidade bucal, sendo a sequência de erupção a ordem em que os dentes entram em erupção.* **Objetivo:** *Determinar os fatores de risco biológicos, nutricionais e comportamentais infantis além dos socioeconômicos maternos relacionados à cronologia de erupção da dentição decídua.* **Métodos:** *Os dados utilizados foram provenientes de um estudo de coorte realizado entre 2003 e 2006 com 86 recém-nascidos. A idade média de erupção dos dentes decíduos de cada criança foi calculada. Em seguida, realizou-se a Análise de Sobrevivência, calculou-se a Curva de Sobrevivência de Kaplan-Méier, os testes LogRank, e as análises de Regressão de Cox com variáveis que apresentaram o p-valor menor que 0,10.* **Resultados:** *A média de erupção dos dentes decíduos variou de oito a 29 meses de vida no arco inferior e no arco superior de 11 a 30 meses de vida. Na Regressão de Cox, foram identificados o consumo de alimentos açucarados como fator de risco para erupção precoce dos seguintes elementos da dentição decídua: 71/81, 74/84 e 54/64. O consumo de outros carboidratos, o consumo de frutas e o acabamento da casa completo como fator de proteção para a erupção tardia respectivamente dos seguintes elementos da dentição decídua: 51/61, 74/84 e 54/64; 73/83, 53/63 e 54/64; e 54/64.* **Conclusão:** *Dos fatores relacionados à cronologia de erupção da dentição decídua, os hábitos alimentares infantis podem acelerar ou retardar a erupção dos dentes decíduos na população abordada. Isso torna necessária a adoção de medidas tais como a análise dos hábitos alimentares e orientações aos pais e profissionais de saúde quanto ao consumo de alimentos saudáveis com o intuito de prevenir a ocorrência de alterações bucais e gerais ocasionadas por tais fatores.*

Palavras-chave | *Erupção Dentária; Cronologia; Fatores de risco.*

ABSTRACT | Introduction: Eruption timing corresponds to the period (in months) when each deciduous tooth erupts in the oral cavity; eruption sequence is the order through which teeth erupts. **Objective:** Determining childhood biological, nutritional and behavioral factors, and mother's socioeconomic factors related to deciduous teeth eruption timing. **Methods:** Data of 86 newborns were collected between 2003 and 2006 from a cohort study. Mean deciduous teeth eruption timing of each child was calculated and results were subjected to Survival Analysis, which was followed by *Kaplan-Méier* Survival Curve calculation; variables presenting p-value smaller than 0.10 were subjected to *LogRank* tests and Cox Regression Analysis. **Results:** Mean deciduous teeth eruption timing ranged from 8 to 29 months in the mandibular arch and from 11 to 30 months in the maxillary arch. Based on the Cox Regression Analysis, sugary food intake was the risk factor for early eruption of the following dental elements: 71/81, 74/84 and 54/64. The intake of other carbohydrates, fruit intake and complete house finishing were protective factors against late eruption of the following elements: 51/61, 74/84 and 54/64; 73/83, 53/63 and 54/64; and 54/64, respectively. **Conclusion:** Childhood nutritional habits, among factors related to deciduous teeth eruption timing, may accelerate or delay such process in the assessed population. This outcome evidences the need of adopting measures, such as dietary habit analysis and parental counseling by health professionals about healthy food intake in order to prevent the occurrence of oral and general disorders related to such factors.

Keywords | Tooth eruption; Chronology; Risk factors.

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INTRODUCTION|

Eruption timing corresponds to the period (in months) when each deciduous tooth erupts in the oral cavity; eruption sequence is the order through which teeth erupts. From a functional standpoint, the most favorable sequence would comprise mandibular teeth eruption before the emergence of maxillary teeth[1].

It is essential knowing deciduous teeth eruption timing and sequence, because it guides physiological age analyses and allows the diagnosis on changes in child growth and development[1,2].

Several tables on eruption timing have been developed; yet, they are an accurate reference to populations that have provided the used data, but individual data concerning variables gender, ethnicity, systemic factors, nutritional aspects, among others[2], may have the power to influence the tooth eruption process.

Investigations on deciduous teeth eruption timing, and factors related to it, must be conducted with different populations, at different periods during the development of the child, since tooth eruption is an integrating part of child body's growth and development. Failures in such process can indicate possible deviations from normality[3].

Therefore, the aims of the present study were to analyze childhood biological, nutritional and behavioral factors and mother's socioeconomic factors related to deciduous teeth eruption timing.

METHODS|

Childhood biological, genetic, nutritional and behavioral factors and mother's socioeconomic factors were taken into consideration to establish a theoretical model to investigate factors related to deciduous teeth eruption timing, which was the basis guiding this research. Different items analyzed, regarding childhood biological, genetic, nutritional and behavioral factors and mother's socioeconomic factors, which are shown in Figure 1.

The investigation analyzed data provided by a longitudinal study conducted with 86 newborns, who underwent follow-upsuntil they reachedthe age of 36 months. The study lasted three years (from 2003 to 2006) and included children living in areas recording the worst child mortality indicators in Vitória City –Espírito Santo State: São Pedro and Bonfim neighborhoods[12].

The study was based on convenience sampling[12]; samples were recalculated in *BioEstat* software*, version 5.3*, at 5% alpha error and power between 55% and 98%.

All children born in these regions in the age groupzero to three months were included in the study. They were referred by Community Health Agents (CHA) - the total sample counted on 86 children.

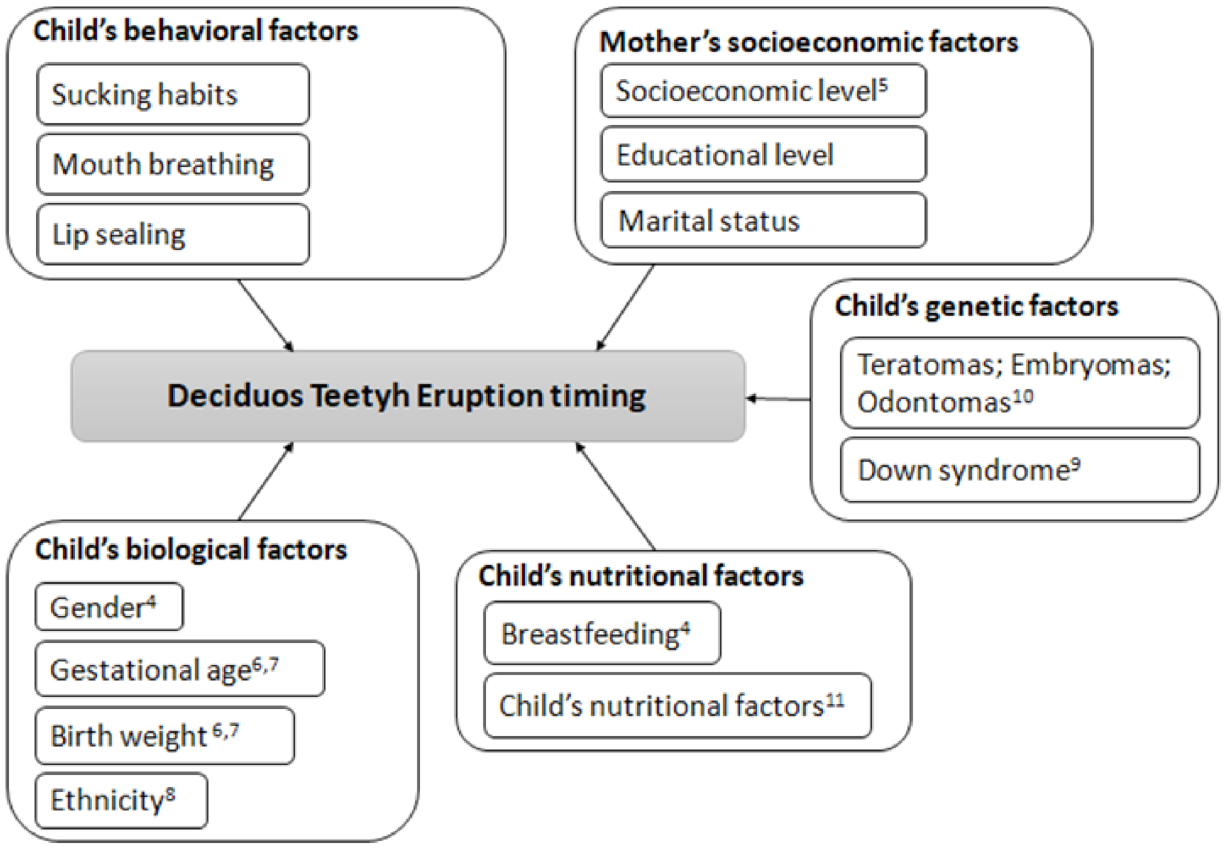
Four investigators accompanied by CHAs made periodic visits to participants' houses, they collected clinical data about children's sucking habits, mouth breathing, breastfeeding, dietary habits and deciduous dentition development. Data collection process was based on the application of a questionnaire to be answered by the mothers and on children's dental clinical examination. Mothers also received information on infant care during these visitations.

Mothers were asked about whether the children were breastfed or bottle fed at the time to assess child dietary habits. Mothers informed when the children started to intake complementary liquids or semi-solid food, they also listed the ingested items such as fruits, vegetables, rice, bread, potatoes and pasta, fish, pork, beef and poultry. The list of eaten food was categorized for further analysis[12].

According to study criteria, teeth were categorized as erupted when any portion of the crown had crossed the gingival barrier and was visible in the oral cavity[2,5]. The age when the first teeth erupted was recorded and the eruption time of other teeth was also recorded based on mothers' recall or on clinical examinations by investigators at each visits.

Overall, the study included eight visits, seven at participants' homes and one at the dental office. Home visits took place every three months in the first two years and every six months in the last year, on average; at the last year, investigators met mothers and children at their homes. A new form was filled with data from the structured interview and clinical examinations at each visit; mothers received counseling at the same event. In

Figure 1 – Theoretical model to investigate factors related to deciduous teeth eruption timing. Vitória-ES, 2014



total, 67 children completed the study after 36 months of follow-up; the other children in the cohort could not be found after a while, because they had moved to other neighborhoods or because they were not at home at the time of the visits.

The study protocol was approved by the Institutional Review Board of the Health Sciences Center of Federal University of Espírito Santo (UFES), protocol n. 0020/2003. Parents signed the informed consent form. The investigator in chief authorized the access to the study project database and the Technical School for Health Professionals Training/Vitória gave access to the Information System on Livebirths (SINASC) database to allow the collection of data about children participating in the study (between 2003 and 2006).

The database was digitized in *SPSS* software *for Windows v. 16.0* (SPSS Inc, Chicago, United States) to calculate the mean age of each child when deciduous teeth eruption was observed by group of teeth; this procedure followed the two-digit system proposed by the American Dental Association (ADA)[13]. Survival Analysis was carried out by taking into account deciduous teeth eruption timing (in months) as variable of interest, as well as all other study variables related to possible risk factors to tooth eruption. *Kaplan-Méier* Survival Curve and *LogRank* tests were calculated to investigate differences between tooth eruption timings of different variable categories by comparing the means and medians of deciduous teeth eruption.

Cox Regression Analyses were applied to independent variables that have recorded p-value lower than 0.10 in the univariate analysis performed through *LogRank* test by taking deciduous teeth eruption timing as dependent variable. The model only included the use of bottle feeding up to six months to calculate strongly associated variables, rather than the use of bottle feeding up to the age of 1 month.

RESULTS|

The Survival Analysis took the deciduous teeth eruption timing as dependent variable and the deciduous teeth eruption was taken as outcome. All variables assessed in the current study were related to the eruption timing of 10 groups of deciduous teeth; their values were subjected to mean/median comparisons. *Kaplan-Méier* Survival Curves were calculated and the *LogRank* test was used to calculate the p-values.

Table 1 presents the means of deciduous teeth eruption (in months) based on binary groups. Tables 2, 3 and 4 highlight the variables related to deciduous maxillary and mandibular central teeth eruption timing, as well as to the eruption time of lateral incisors, canines and first and second molars. All these variables recorded statistically significant values lower than 0.10, regardless of early or late deciduous teeth eruption timing.

Table 5 displays the independent variables, which were statistically significant to each dependent variable, as well as the *Hazard Ratio (HR)* value of the respective lower and upper limits of the 95% confidence interval and the p-value found in the *Wald* test.

Based on Cox Regression results, sugary food intake is a risk factor for the early eruption of 71/81, 74/84 and 54/64. The intake of other carbohydrates was a protective factor against the late eruption of 51/61, 74/84 and 54/64. In addition, according to regression analysis outcomes, fruit intake is a protective factor against the late eruption of 73/83, 53/63 and 54/64. Good house finishing was a protective factor against the late eruption of 54/64.

Any of the assessed variables presented statistical significance in the regressions applied to the eruption of 72/82, 52/62, 75/85 and 55/65. Moreover, variables related to participants' biological and behavioral factors did not present values of statistical significance lower than 0.10 in any of the 10 groups of deciduous teeth evaluated.

DISCUSSION|

The choice made for the Survival Analysis methodology enabled determining factors related to deciduous teeth eruption timing. It was possible checking the factors that accelerate or delay tooth eruption by using this technique. The present outcomes refer to the eruption of ten groups of deciduous teeth[14].

Investigations focused on analyzing the relationship between determining factors and the deciduous teeth eruption often address few factors capable of influencing the eruption process[4,5,6,7]. Reviews on this topic mention several factors related to deciduous teeth eruption[10,15].

Table 1 – Mean age of deciduous teeth eruption. Vitória-ES, 2003-2006

Erupting deciduous teeth	N (number of children)	Mean (in months)	Frequency	Standard deviation	Minimum	Maximum
71/81	80	8.3	7 (8.7%)	3.1	1.0	16.0
51/61	79	11.4	9 (11.4%)	2.7	6.0	19.0
52/62	78	13.5	7 (8.9%)	3.9	6.0	27.0
72/82	78	15.6	5 (6.4%)	4.7	6.0	27.0
54/64	76	19.6	7 (9.2%)	4.1	12.0	31.0
74/84	75	19.7	7 (9.3%)	4.4	12.0	31.0
53/63	75	21.6	6 (8.0%)	4.5	10.0	30.0
73/83	75	22.4	3 (4.0%)	5.1	10.0	39.0
75/85	69	29.0	5 (7.2%)	4.5	19.0	40.0
55/65	66	30.8	9 (13.6%)	4.8	19.0	41.0

Table 2 – Bivariate Kaplan-Méieranalysis of deciduous maxillary and mandibular central teeth eruption timing and of lateral incisors, as well as other variables based on their categories. Vitória-ES, 2003-2006

	71/81			51/61			72/82			52/62		
	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value
Child's biological factors												
Gender (Male)	8.1 (7.2-8.9)	7.5 (6.3-8.7)	0.391	11.1 (10.3-11.8)	11.0 (10.0-11.9)	0.332	15.3 (13.6-17.0)	14.0 (12.9-15.1)	0.981	12.8 (11.7-13.8)	12.0 (11.4-12.6)	*0.088
Gender (Female)	8.4 (7.4-9.5)	8.0 (6.4-9.6)		11.6 (10.7-12.5)	11.0 (10.0-11.9)		15.8 (14.5-17.1)	16.0 (14.2-17.7)		14.1 (12.8-15.4)	14.0 (13.4-14.6)	
Child's behavioral factors												
Use of bottle at 1 month (Yes)	8.0 (6.8-9.3)	7.0 (5.9-8.0)	0.867	10.6 (9.7-11.5)	11.0 (9.9-12.0)	0.084	15.2 (13.5-16.8)	15.0 (13.9-16.1)	0.604	12.3 (11.1-13.5)	12.0 (10.7-13.3)	*0.086
Use of bottle at 6 months (Yes)	8.5 (7.6-9.3)	8.0 (6.9-9.1)	0.671	11.1 (10.5-11.7)	11.0 (10.1-11.8)	*0.046	16.1 (14.8-17.4)	15.0 (13.6-16.4)	0.273	13.3 (12.3-14.4)	13.5 (12.9-14.1)	0.561
Lip sealing before 12 months (Yes)	7.8 (6.7-8.9)	7.0 (5.2-8.8)	0.104	11.1 (10.0-12.2)	12.0 (11.4-12.6)	0.468	15.4 (13.6-17.3)	14.0 (11.2-16.7)	0.352	12.4 (11.2-13.6)	12.5 (11.3-13.7)	*0.072
Mother's socioeconomic factors												
schooling (incomplete elementary school)	9.1 (7.9-10.3)	9.0 (7.9-10.1)	*0.035	11.6 (10.7-12.6)	12.0 (11.4-12.6)	0.407	16.4 (14.7-18.1)	16.0 (14.6-17.3)	0.204	13.9 (12.4-15.4)	12.0 (10.5-13.5)	0.477
schooling (higher than complete elementary school)	7.7 (6.9-8.5)	7.5 (6.4-8.5)		11.1 (10.4-11.9)	11.0 (10.2-11.8)		15.0 (13.7-16.3)	14.0 (13.3-14.7)		13.2 (12.1-14.2)	13.0 (12.4-13.6)	
Child's nutritional factors												
Exclusive breastfeeding until the age of 6 months (Yes)	9.8 (7.3-12.2)	8.0 (5.2-10.7)	0.169	13.1 (10.4-15.8)	13.0 (10.3-15.7)	*0.067	16.3 (14.0-18.7)	14.0 (10.5-17.4)	0.912	16.6 (12.7-20.4)	14.0 (9.8-18.2)	*0.046
Semi-solid food at4 months (Yes)	7.8 (6.8-8.7)	7.0 (5.9-8.0)	0.222	10.8 (10.0-11.6)	11.0 (9.7-12.3)	*0.055	14.5 (12.9-16.2)	14.0 (12.7-15.3)	0.202	12.7 (11.4-13.9)	12.0 (10.9-13.1)	0.110
Fruit intake (Yes)	8.8 (7.9-9.7)	8.5 (7.7-9.3)	0.249	12.1 (11.4-12.7)	12.0 (11.1-12.8)	*0.060	16.7 (15.4-18.0)	16.0 (13.1-18.8)	0.052	14.4 (13.3-15.5)	14.0 (13.5-14.5)	*0.047
Intake of other carbohydrates (Yes)	8.7 (7.7-9.6)	8.5 (7.3-9.7)	0.116	11.8 (10.9-12.5)	12.0 (11.1-12.9)	*0.029	16.3 (15.0-17.6)	16.0 (14.7-17.3)	0.198	14.0 (12.9-15.2)	14.0 (13.1-14.9)	0.081
Sugary food intake (Yes)	6.0 (4.8-7.1)	6.0 (4.4-7.6)	*0.030	11.1 (8.0-14.2)	11.0 (6.9-15.0)	0.794	13.0 (10.0-15.9)	14.0 (7.6-20.4)	0.127	11.7 (9.3-14.0)	11.0 (9.4-12.6)	0.226
Thickeners intake (Yes)	8.7 (7.9-9.6)	9.0 (8.2-9.8)	0.284	11.8 (10.9-12.6)	12.0 (11.3-12.6)	0.211	16.3 (15.0-17.7)	16.0 (14.3-17.7)	0.305	14.3 (13.1-15.5)	14.0 (13.5-14.5)	*0.018

*p<0.10.

Table 3 – Bivariate Kaplan-Méier analysis of deciduous maxillary and mandibular canine eruption timing and of other variables based on their categories. Vitória-ES, 2003-2006

	73/83			53/63		
	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value
Child's biological factors						
Gender (Male)	22.0 (20.5-23.6)	21.0 (19.9-22.1)	0.576	20.5 (19.2-21.8)	20.0 (19.0-20.9)	*0.011
Gender (Female)	22.7 (21.0-24.4)	21.5 (17.9-25.1)		22.5 (20.9-23.9)	24.0 (20.5-27.5)	
Gestational age (32nd to 36th week)	24.2 (19.9-28.5)	21.0 (15.8-26.2)	0.668	26.2 (22.8-29.7)	28.0 (0.0-0.0)	*0.046
Gestational age (37th to 41st week)	22.4 (21.1-23.6)	21.0 (19.9-22.1)		21.3 (20.2-22.3)	20.0 (18.9-21.1)	
Mother' socioeconomic factors						
House finishing (complete)	21.6 (20.3-22.8)	21.0 (20.2-21.8)	*0.038	21.5 (20.2-22.8)	21.0 (19.8-22.2)	0.927
House finishing (incomplete)	23.8 (21.6-26.0)	21.0 (15.8-26.2)		21.7 (20.1-23.3)	21.0 (19.3-22.7)	
Child's nutritional factors						
Meat intake (Yes)	23.2 (20.8-25.6)	25.0 (20.9-29.1)	0.914	23.5 (21.1-25.8)	25.0 (19.3-30.7)	*0.088
Fruit intake (Yes)	23.9 (22.5-25.4)	23.0 (18.9-27.0)	*0.001	22.7 (21.5-23.9)	22.0 (19.0-24.9)	*0.028
Sugary food intake (Yes)	19.8 (19.5-20.2)	20.0 (0.0-0.0)	*0.094	21.3 (18.7-23.9)	20.0 (0.0-0.0)	0.518

*p<0.10.

Table 4 – Bivariate Kaplan-Méier analysis of deciduous maxillary and mandibular first and second molar eruption time and of other variables based on their categories. Vitória-ES, 2003-2006

	74/84			54/64			75/85			55/65		
	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value	Mean (CI=95%)	Median (CI=95%)	p-value
Child's biological factors												
Gender (Male)	19.4 (18.0-20.8)	19.0 (17.4-20.6)	0.625	19.4 (18.0-20.8)	19.0 (16.9-21.1)	0.917	28.5 (27.2-29.9)	29.0 (27.8-30.2)	0.235	30.0 (28.5-31.5)	30.0 (29.1-30.9)	*0.068
Gender (Female)	19.9 (18.6-21.4)	19.0 (17.2-20.8)		19.7 (18.4-20.9)	19.5 (18.2-20.8)		29.4 (27.8-31.0)	29.0 (27.0-30.9)		31.6 (29.9-33.3)	32.0 (29.7-34.3)	
Ethnicity (Black)	17.3 (14.1-20.6)	19.0 (0.0-0.0)		17.5 (13.9-21.1)	19.0 (13.0-24.9)		24.0 (20.6-27.4)	24.0 (19.2-28.8)		27.7 (18.9-36.4)	30.0 (12.4-47.6)	
Ethnicity (Admixture)	19.4 (17.6-21.2)	18.0 (15.6-20.4)	0.451	19.1 (17.7-20.5)	19.0 (17.2-20.8)	0.293	29.9 (28.0-31.9)	30.0 (28.2-31.8)	*0.000	31.6 (29.7-33.6)	31.0 (28.7-33.3)	*0.030
Ethnicity (White)	20.1 (17.8-22.4)	20.0 (17.3-22.7)		20.2 (18.0-22.4)	20.0 (17.5-22.5)		26.9 (25.3-28.4)	27.0 (25.5-28.5)		28.3 (6.5-30.2)	28.5 (26.6-30.4)	
Child's behavioral factors												
Use of bottle at 1 month (Yes)	18.3 (16.9-19.7)	19.0 (16.9-21.1)	*0.061	18.6 (17.1-20.0)	19.0 (17.1-20.9)	0.137	28.4 (26.8-30.0)	29.0 (27.4-30.6)	0.316	29.8 (27.8-31.9)	29.0 (27.8-30.2)	0.392
Use of pacifier up to 12 months (Yes)	18.9 (17.6-20.3)	18.0 (16.5-19.5)	*0.071	19.2 (17.8-20.6)	19.0 (17.5-20.5)	0.275	29.2 (27.9-30.5)	29.0 (27.7-30.3)	0.922	30.3 (28.9-31.8)	30.0 (28.6-31.4)	0.351
Mother' socioeconomic factors												
Separation after birth (Yes)	17.1 (14.9-19.4)	18.0 (12.9-23.1)	*0.050	17.1 (14.9-19.4)	18.0 (12.9-23.1)	*0.040	30.1 (26.9-33.4)	31.0 (25.9-36.1)	0.603	29.0 (25.2-32.7)	29.0 (25.2-32.8)	0.270
House finishing (Complete)	20.1 (18.8-21.4)	20.0 (18.9-21.1)	0.223	20.4 (19.2-21.6)	20.0 (19.5-20.5)	*0.011	29.2 (28.2-30.3)	29.0 (27.6-30.4)	0.708	30.8 (29.5-32.2)	30.0 (28.4-31.6)	0.867
House finishing (Incomplete)	18.9 (17.5-20.5)	18.0 (16.7-19.3)		18.2 (17.0-19.4)	18.0 (17.3-18.6)		28.7 (26.4-30.9)	29.0 (26.6-31.4)		30.8 (28.7-33.0)	30.0 (28.1-31.9)	
Child's nutritional factors												
Exclusive breastfeeding until 6 months (Yes)	22.4 (20.3-24.4)	22.0 (19.3-24.7)	0.253	20.9 (20.0-21.8)	20.5 (19.1-21.9)	0.604	27.1 (25.2-29.1)	27.0 (24.4-29.6)	*0.052	31.5 (28.5-34.5)	30.0 (28.7-31.3)	0.935
Intake of other proteins (Yes)	18.5 (13.6-23.4)	16.0(0.0-0.0)	0.594	18.5 (13.6-23.4)	16.0(0.0-0.0)	0.586	24.0 (20.1-27.9)	22.0(0.0-0.0)	*0.008	27.8 (26.3-29.2)	27.0(0.0-0.0)	*0.037
Fruit intake (Yes)	20.5 (19.2-21.7)	20.0 (18.9-21.1)	*0.048	20.5 (19.3-21.7)	20.0 (19.5-20.5)	*0.057	29.3 (28.1-30.5)	30.0 (28.8-31.2)	0.725	30.9 (29.7-32.2)	30.0 (28.4-31.6)	0.671
Intake of other carbohydrates (Yes)	20.5 (19.3-21.8)	20.0 (18.5-21.5)	*0.013	20.5 (19.3-21.6)	20.0 (18.8-21.2)	*0.018	28.9 (27.7-30.2)	30.0 (28.7-31.3)	0.971	30.8 (29.3-32.2)	30.0 (28.9-31.1)	0.579
Beans intake (Yes)	19.6 (18.2-20.9)	19.0 (17.3-20.7)	0.688	19.7 (18.4-20.9)	20.0 (18.8-21.2)	0.713	27.8 (26.6-29.2)	29.0 (27.4-30.6)	*0.019	29.9 (28.2-31.6)	30.0 (29.2-30.8)	0.305
Sugary food intake (Yes)	14.8 (12.3-17.4)	15.0 (10.9-19.0)	*0.000	17.2 (14.6-19.7)	17.0 (13.8-20.2)	*0.052	26.0 (20.0-31.9)	28.0 (15.2-40.8)	0.211	31.0 (29.0-32.9)	30.0(0.0-0.0)	0.857

*p<0.10.

Table 5 – Cox Regression Analysis of variables significantly associated with deciduous teeth eruption timing. Vitória-ES, 2003

	71/81		51/61		73/83		53/63		74/84		54/64	
	HRaj (CI 95%)	p-value	HRaj (CI 95%)	p-value	HRaj (CI 95%)	p-value	HRaj (CI 95%)	p-value	HRaj (CI 95%)	p-value	HRaj (CI 95%)	p-value
Mother's socioeconomic factors												
House finishing											0.38 (0.22-0.64)[6]	0.000
Child's nutritional factors												
Fruit intake					0.39 (0.21-0.69)[3]	0.002	0.38 (0.21-0.69)[4]	0.001			0.57 (0.34-0.98)[6]	0.042
Intake of other carbohydrates			0.57 (0.32-1.0)[2]	0.051					0.45 (0.24-0.85)[5]	0.013	0.37 (0.20-0.69)[6]	0.002
Sugary food intake	3.3 (0.99-10.8)[1]	0.053							6.77 (1.54-29.8)[5]	0.011	3.89 (1.15-13.17)[6]	0.029

[1] Adjusted for mother's educational level. [2] Adjusted for bottle use up to 6 months old; Complementary semi-solid food before the age of 4 months; Fruit intake; Exclusive breastfeeding up to 6 months old. [3] Adjusted for House finishing; Sugary food intake. [4]Adjusted for Gender; Gestational age; Meat intake. [5]Adjusted for bottle use up to 1 month old; Pacifier suction up to 12 months old; Fruit intake; Parents' separation after child's birth. [6]Adjusted for Parents' separation after child's birth.

Some determinants were considered independent variables and classified into thematic groups to be used in the theoretical model adopted in the present study. This process allowed the conduction of bivariate analyses focused on evaluating possible causal and non-causal associations based on the criteria described by Hill[16], such as association strength. Based on this outcome, such strong association has greater chance to be causal than weak associations; moreover, association strength depends not only on children's biological nature, but rather on the prevalence of other component causes. Factors assessed through Cox regression models allowed an in-depth analysis, which was applied to determine the concomitant influence of significant factors related to deciduous teeth eruption through multivariate models.

Transmissibility of the herein assessed characteristics might have been influenced by factors external to genes. The term epigenetics is currently used to indicate hereditary changes in DNA structure and organization, which do not involve changes in DNA sequence[17]. These epigenetic changes were mainly influenced by environmental factors such as diet, and they may have occurred due to parents' dietary habits, intrauterine environment, maternal nutrition during pregnancy, perinatal and post-natal nutrition[18]. However, it was not possible measuring all these factors in the present study and such theory may explain the present deciduous teeth eruption results. Therefore, these results made it possible inferring that the deciduous teeth eruption process could be influenced by epigenetic factors such as the diet assessed in the current study.

Although it is clear that some diseases sporadically observed in humans are associated with epigenetic changes, their effect on future generations remains unclear. Accordingly, efforts have been made to improve maternal and fetal nutritional status in order to improve pregnancy outcomes and to include early interventions in children's health[17,19].

Variables related to children's diet were strongly associated with tooth eruption; therefore, it is important highlighting that dietary patterns have been changing in Brazil in recent decades[20]. There are evident and worrisome trends concerning some food, with emphasis on the increased consumption of industrialized products, such as cookies and soft drinks, on persistent and excessive sugary food intake and on insufficient ingestion of fruits and vegetables[20].

Sugary food intake in the current study emerged a risk factor to the early eruption of 71/81, 74/84 and 54/64because there was mean difference in tooth eruption in the age of three months in comparison to tooth eruption age in children belonging to the group that was not subjected to sugary food intake. The relationship between this food type consumption and the early eruption of deciduous teeth can be explained by the early introduction and high amounts of sugar in babies' diet, rather than the adoption of a healthy diet. This finding reflects industrialization influence on dietary patterns that trigger epigenetic modifications.

The onset of complementary feeding with bottle before the age of three months reached 40% of children in the cohort. Bottle feeding is usually accompanied by animal or artificial milk intake with the addition of thickeners presenting high sucrose levels. Based on the present results, 90% of children were treated with thickeners and 72.6% of them were exposed to sugary food intake. Most of these children presented early eruption of 71/81, 74/84 and 54/64 and this outcome reflects the early insertion of thickeners and sugary food in babies' diets, fact that can influence the tooth eruption process.

There is a growing trend of inappropriate infant feeding due to low consumption of fruits, vegetables and milk, mainly among children and adolescents due to the early and high consumption of sweets, fat and sugary drinks[20]. This scenario differs from recommendations of the Ministry of Health[21], which mainly advocates for breastfeeding until the age of six months, without the introduction of water, teas or any other food, since breastfeeding is the healthier practice for babies. Complementary food are supposed to be introduced after the age of six months, when the babies develop the ability to masticate and food consistency stimulates the maturation of the mastication process[11].

Among results related to complementary feeding, carbohydrate intake was a protective factor against the late eruption of 51/61, 74/84 and 54/64. The prevalence of complementary food intake reached 70%, and this number is within the expected range for this population when the Brazilian food pyramid for children[21,22] is taken into account.

The eruption of mandibular central incisors is guided by both the lower lip and the tongue when complementary food is introduced when children are between six and seven months old. The incisal guide and emergence of the first signs of mastication[1] are observed after the aforementioned ages due to the eruption of maxillary central incisors. Changes observed in the present study often took place in most children when they were close to eight months old.

Maxillary and mandibular first molars are the next teeth to erupt, and this new stage is expected to establish teeth in first intercuspation, and it defines the sense of occlusion, which means the anteroposterior and centric occlusal relationship between dental arches[1]. Mastication movements appear and mature swallowing is learned after this relationship is developed, but such process involves the participation of muscles innervated by cranial nerve V (trigeminal nerve)[1]. Intercuspation took place when children were close to the age of 19 months in the present study.

Fruit intake was a protective factor against the late eruption of 73/83, 53/63 and 54/64. In addition, the prevalence of fruit and vegetable intake reached 68.5% and 75.3%, respectively; these values are higher than the ones reported by Saldiva et al.[23], who assessed the dietary habits of children and students. Their findings indicate that mothers in the present study are quite aware of the need to include fruits and vegetables in their children's diet.

Fruits should preferably be offered in the form of purees and juices[21], since their introduction and the introduction of vegetables in meals helps the maturation of stomatognathic system structures. This process leads to better suction, mastication and swallowing performance, and to children's general and neurological development[11], which meets deciduous teeth eruption periods.

Occlusion guide is established by the eruption of canine teeth, as well as by a neural circuit that allows the lateral mandibular movement, and it allows food cutting and grasping[1]. This process was observed when children were close to 22 month sold in the current study. Second molars are the last teeth to erupt, and the emergence of the deciduous dentition is the end of the eruptive process, which defines the masticatory cycles, when children were close to 30 months old. Paste diets decrease muscle resistance at this age and it can have atrophic effect on maxillary bones, whereas more fibrous diet scan influence stomatognathic system development, increase muscular efforts and stimulate bone structure growth[11].

Sugary food intake was high at the expense of a healthier diet, which requires greater masticatory function demand. Although children have been consuming more fibrous food such as carbohydrates, fruits and vegetables, it is not known how these food were prepared, if they were smashed or crushed. In addition, exclusive breastfeeding until the children reach the age of six months old is an initial factor for good facial development, because it helps the development of neuromuscular balance in tissues of the masticatory system[1]. Most children in the present cohort were not subject to exclusive breastfeeding until the age of six months, due to the early introduction of complementary food.

Complete house finishing, which is a protective factor against the late eruption of 54/64, is another factor to be taken into consideration. According to Duarte-Martins et al.[24], the quality of the environment, in association with socioeconomic factors, influences risk situations for children's health and development. Consequently, these factors affect children's oral and facial development, which is directly related to child development and thus related to socioeconomic factors; however, socioeconomic status did not present statistical significance, probably because the sample was homogeneous. In addition, this variable may have differentiated the most from the least poor individuals, since complete house finishing demands good income for a long period-of-time, which cannot be measured just by asking interviewees about their family income in the last month prior to the application of the survey. However, these findings are insufficient to explain the influence of socioeconomic status on tooth eruption, which may have occurred by chance in this analysis, even if this probability was lower than 5%;yet, this process may have occurred when several statistical processes were performed. Moreover, the association between tooth eruption and the socioeconomic variable was only observed in one assessment among the Cox regression analyses.

Although there may have been a memory bias due to data based on mothers' recalls about their babies' deciduous teeth eruption period, overall, mothers usually remember the eruption of their child's first teeth. In addition, the food introduction period was not herein analyzed; yet, it was observed that initial and final diets did not present major changes, they only evolved from paste to more fibrous consistency food - similar to the dietary pattern of their own family.

Further studies must focus on elucidating the reasons why some factors influence the eruption of some teeth, whereas others do not.

CONCLUSION |

Among factors related to deciduous teeth eruption timing, children's dietary habits may influence on deciduous teeth eruption, by accelerating and/or delaying deciduous teeth eruption in the herein assessed population.

Sugary food intake was identified as risk factor to some groups of teeth, fact that evidences changes in children's feeding patterns, which are based on increased ingestion of processed food.

Carbohydrate and fruit intake was a protective factor against the late eruption of some teeth. These food types are more fibrous and recommended to be consumed after the age of six months in order to stimulate mastication maturation. However, despite the adequate intake of this food by children in the current sample, mothers did not provide information on how it was prepared.

By taking into consideration that dietary habits induce epigenetic modifications[17,18,19] and may influence the eruption process, one can observe that intervention measures should be adopted by the parents and health professionals, including masticatory function and dietary habit analysis, as well as counseling on healthy food intake due to greater masticatory function demand, rather than processed food intake, mainly of sugary food, in order to prevent the occurrence of oral and general disorders caused by such factors.

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