

Perinatal outcomes and changes in the oral cavity: Brazilian cohorts of Ribeirão Preto and São Luís

Desfechos perinatais e alterações na cavidade bucal: coortes brasileiras de Ribeirão Preto e São Luís

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ABSTRACT: Studies have shown a possible association of oral diseases during pregnancy with preterm birth (PTB) and low birth weight (LBW). These perinatal outcomes appear to be associated with enamel defects in the primary dentition, which, in turn, seem to predispose to future development of caries in children. Therefore it is relevant to include oral health variables of the mother/child dyad in cohort studies to understand how these factors are associated. The objectives of this study are: 1) check if there is an association between diseases of the oral cavity of pregnant women and PTB, 2) test the hypothesis of association between perinatal outcomes and enamel defects/dental caries in children, 3) examine whether there are associations between perinatal outcomes and disorders of tooth eruption in children; 4) build theoretical models to study social inequities as a common factor between oral conditions and perinatal outcomes. We used an integrated, collaborative approach between two Brazilian cities with contrasting socioeconomic conditions: São Luís, MA, and Ribeirão Preto, SP - British Birth Cohort Studies study (BRISA Ribeirão Preto, São Luís). Two cohorts were evaluated: one initiated at birth, representative of the population of live births, and another, initiated prenatally. Participants were reassessed from the beginning of the second year of life. It is expected that these cohorts will contribute to foster the development and consolidation of population-based follow-up studies in Brazil.

Keywords: Epidemiologic studies. Premature birth. Oral health. Periodontal diseases. Dental caries. Dental enamel.

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RESUMO: Estudos vêm mostrando uma possível associação das doenças bucais no período gestacional com o nascimento pré-termo (NPT) e o baixo peso ao nascer (BPN). Esses desfechos perinatais parecem se associar com defeitos de desenvolvimento do esmalte (DDE) na dentição decídua, que, por sua vez, parecem predispor ao desenvolvimento futuro de lesões de cárie nas crianças. Assim, é relevante a inclusão de variáveis de saúde bucal do binômio mãe/filho nos estudos de coorte para a compreensão de como esses fatores se associam. Os objetivos deste estudo são: 1) verificar se existe associação entre doenças da cavidade bucal da gestante e o NPT; 2) testar a hipótese de associação entre desfechos perinatais e defeitos de esmalte/cárie dentária nas crianças; 3) analisar se existem associações entre desfechos perinatais e distúrbios de erupção dentária nas crianças; 4) construir modelos teóricos para estudo das iniquidades sociais como fator comum entre os desfechos perinatais e condições bucais. Utilizou-se abordagem integrada e colaborativa entre duas cidades brasileiras com condições socioeconômicas contrastantes: São Luís, MA; e Ribeirão Preto, SP - estudo BRISA (*Brazilian Birth Cohort Studies, Ribeirão Preto-São Luís*). Duas coortes foram avaliadas: uma iniciada ao nascimento, representativa da população de nascidos vivos; e outra iniciada no pré-natal. Os participantes foram reavaliados a partir do início do segundo ano de vida. Espera-se que estas coortes contribuam para fomentar o desenvolvimento e consolidação de pesquisas de seguimento, de base populacional, no Brasil.

Palavras-chave: Estudos epidemiológicos. Nascimento prematuro. Saúde bucal. Doenças periodontais. Cárie dentária. Esmalte dentário.

INTRODUCTION

Preterm birth (PTB) is of global relevance as it increases neonatal morbidity and mortality rates. Its incidence is increasing¹, as the overall rate was estimated at 9.6% in 2005² and 11.08% in 2010, affecting least developed countries, but also rich nations. Among the mechanisms by which risk factors for PTB are identified, a significant hypothesis is that maternal infections, including those of oral origin⁴, could trigger inflammatory responses in the mother or in the fetus and set off a cascade of events that would result in PTB. Studies show that periodontal diseases (PD) are likely associated with PTB⁴, in addition to dental caries and their aggravations⁵. However, there is some controversy with regard to infections as risk factors for PTB^{4,6}, and few cohort studies provide such evidence⁷.

Preterm infants usually suffer from low birth weight (LBW)¹. Studies have revealed a possible association between PD⁷ during pregnancy with LBW and with developmental defects of enamel (DDE)⁸ in the primary dentition. These findings indicate the importance of including oral health (OH) variables for mother and child in cohort studies so as to understand how such factors are associated with different outcomes. Furthermore, situations of social inequality seem to be a common “background” for PTB, LBW³, and oral health problems⁸, as a validation of the inclusion of social and economic variables as potential confounding

factors in cohort data analysis that intend to study association between perinatal outcomes and changes in the oral cavity.

The main purposes of the Brazilian cohorts (Brazilian birth cohort studies – BRISA), that include OH variables, are:

1. to ascertain if there is an association between oral diseases in pregnant women and PTB;
2. to test the hypothesis of association between perinatal outcomes with DDE and dental caries in children;
3. to examine whether there is an association between perinatal outcomes and disorders of tooth eruption in children; and
4. to build theoretical models to study social inequalities as a common factor between perinatal outcomes and oral conditions in mothers and children from the cohort.

FEATURES AND METHODOLOGY

The Brazilian birth cohort studies in Ribeirão Preto and São Luís (BRISA) investigated new factors in the PTB etiology, using an integrated and collaborative approach in two Brazilian cities with contrasting socioeconomic indexes: Ribeirão Preto (RP), in São Paulo, and São Luís (SL), in Maranhão. There are two closed prospective cohorts in each municipality. In all four cohorts there are data on mothers and their children. All procedures and instruments were standardized for both locations, so as to allow future comparisons.

The first cohort comprised women having a singleton pregnancy, at a gestational age (GA) of 22-25 weeks, whereas 1,447 pregnant women are in SL and 1,417, in RP. Out of those, 1,381 (95.4%) in SL and 1,370 (96.7%) in RP were reassessed at childbirth. And, more recently, 1,160 children in SL and 1,077 in RP were reexamined after their second year of life. The prenatal cohort sample was a convenience sample. In RP, women were recruited from a registration database of pregnant women, already existing in the municipality. In SL, women were recruited from three public maternity wards and a healthcare facility. All women had a pregnancy ultrasound scan in the first trimester to determine gestational age.

In this cohort, clinical examinations were performed, including dental examinations and biological sampling of the pregnant women — saliva, gingival crevicular fluid, and venous blood, among others. To gather additional information, two structured questionnaires were used. The first one was conducted through interviews and was divided into nine sections of data, including one on OH; the second one was self-administered.

During the prenatal period, the following OH indicators were assessed: visible plaque index (VPI); calculus index (CI); bleeding on probing index (BOP) and spontaneous bleeding; furcation defect; clinical attachment level (CAL); probing pocket depth (PPD); and saliva and biofilm collection. In order to assess dental caries, the DMFT index was applied. For the classification of endodontic infections, the PUFA (severe caries with pulpal involvement, ulceration, fistula, and abscess) index was used.

The oral examination of pregnant women was performed in a dental office, by six examiners calibrated in different research indexes, with an inter-examiner reliability measured by the Kappa coefficient (ranging from 0.55 to 0.99 for the BOP and reaching 1.0 for the furcation defect diagnosis). As for the quantitative variables (intra-class correlation coefficient – ICC; intra-examiner and inter-examiner), the ICC ranged from 0.54 to 1.0 for the VPI, from 0.64 to 0.88 for the CAL, and from 0.58 to 0.96 for the PPD).

The second cohort in each municipality is a population-based birth cohort, for which recruitment was carried out from January to December 2010. All hospital births to RP residents were included, totaling 7,747 births, and one in three in SL was included, totaling 5,162 births. In SL, sampling was a probability stratified sample with systematic tickets. For the interviews, two questionnaires were used (data for mother and child). The mother's questionnaire had identification, contact, demographic, socioeconomic, lifestyle, partners', sexual and reproductive health, morbidities, current pregnancy and prenatal care, and labor and birth data. The questionnaire to be completed with the newborn's information contained the following sections: identification, anthropometry, and biological material collected.

All children were recruited for reassessment at one year of age (between 13 and 30 months). In SL, 3,304 follow-ups of nursing babies and their mothers were carried out (birth cohort) and 1,160 follow-ups of nursing babies in the prenatal cohort were conducted. In RP, 4,182 children were reassessed (1,077 in the prenatal cohort).

Some procedures were performed in children with PTB and/or with LBW and/or born in twin birth, as well as in part of those born at full-term. The OH indicators collected are: VPI, BOP, bleed on brushing, and modified DDE index. The International Caries Detection and Assessment System (ICDAS-II) and the Nyvad criteria were used to assess dental caries. Furthermore, breastfeeding, deleterious oral habits, diet quality, micronutrient intake, and frequency of carbohydrate consumption were investigated. Clinical examinations were also carried out in children and mothers, biological material was collected, and questionnaires on mothers' data, as well as health, development, and a 24-hour dietary recall for the children were administered.

CHALLENGES AND LINES OF RESEARCH

One of the challenges in evaluating data on oral health in a medical cohort was the extensive period necessary to carry out dental examinations, as well as the uncertainty about future funding.

With regard to these cohorts, some oral health studies are being developed:

- association between oral infections (PD, dental caries, and endodontic infection) and preterm birth;
- theoretical models for PD: latent variable to assess PD;
- hierarchical models in the etiology of early childhood caries (ECC);
- nutritional risk factors associated with ECC;

- association between low birth weight, preterm birth, and intrauterine growth restriction and oral health problems (dental caries, DDE, disorders of tooth eruption) in children; and
- association between maternal and child OH and gestational factors (number of pregnancies and interpregnancy interval, prenatal care, diseases during pregnancy, among others).

The study was approved by the Research Ethics Committee (REC) from the Hospital das Clínicas of the Ribeirão Preto Medical School (HC-FMRP), of the Universidade de São Paulo (USP) (Proc. No. 4116/2008), and the Hospital Universitário of the Universidade Federal do Maranhão (HU-UFMA) (Proc. No. 4771/2008-30) and was funded by the National Council for Scientific and Technological Development (CNPq), the Maranhão Research and Scientific and Technological Development Foundation (FAPEMA), and the São Paulo Research Foundation (FAPESP).

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