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Research Paper

Preterm Birth and Breastfeeding Are Related to Gastroesophageal Reflux Onset: An Observational Cross-Sectional Study

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Abstract

This study has been aimed to investigate about the relationship between pediatric oral and systemic pathologies coexisting with preterm birth condition. 640 children born in L'Aquila (Italy) in 2007 were selected by the archives of the University of L'Aquila. Only 137 out of 640 children were recruited in order to participate to this study. 65 of them were females and 72 males. Each patient underwent a complete and accurate intraoral and dental examination. Study has been approved 17/Jan/2014 and registered by University of L'Aquila (Italy). We found high incidence of gastro-esophageal reflux (GER) related to two different and independent factors: the preterm birth and the breastfeeding. Moreover, patients suffering from gastro-esophageal reflux appeared to be more exposed to the onset of teeth discoloration and showed an improved susceptibility to the amelogenesis imperfecta. This clinical picture can be easily explained due to the acid environment created by gastric reflux. In the light of our findings, it is clear how the close cooperation between pediatricians and dentists plays a key-role for the prevention and the early treatment of the oral and gastric diseases. A clear and well-known workflow should be followed by all the physicians when they treat a preterm child so to involve a multidisciplinary team to obtain a complete clinical picture.

Key words: dental prevention, dental education, preterm children, gastroesophageal reflux, breastfeeding.

Introduction

Preterm children represent an issue that stimulates economic, social and healthcare evaluations. According to World Health Organization (WHO), a newborn with less than 37 weeks of gestation is to be considered premature, or preterm. [1]

Scarce gestational age and low birth weight are the main factors closely related to neonatal complications and pathologies. Many anomalies involving the oral cavity are particularly frequent in such patients: among the most prevalent oral alterations, preterm children are suffering from dental caries, malocclusion, enamel hypoplasia and dental discolorations.[2] These oral alterations are mostly related to alterations affecting the digestive tract of preterm children: a study carried out by Funderburk [3] demonstrated that the clinical characteristics of gastro-esophageal reflux (GER) in preterm and term infants were similar, however, many studies have also

demonstrated that defects of enamel are deeply influenced by etiological factors that may be influencing already before the birth.[4] In preterm children, teeth are often more susceptible to caries and such alterations are often linked to an early onset GER: the severe hypocalcification of the dental tissues and the rapid onset of carious lesions strongly affect the esthetics of patients, with a negative impact also on social and psychological aspects.[5,6] In the light of this framework, our study has been aimed to investigate about the relationship between pediatric oral and systemic pathologies coexisting with preterm birth condition.

Material and Methods

Study model

This is an observational cross-sectional study conducted in the central macro-area of Italy. The main limitation of our study is related to the low participation of the patients.

Subjects and data collection

This study was carried out on a total of 137 children all birth in 2007 (65 female and 72 male), patients were both in deciduous and in mixed dentition. Subjects investigated were recruited from the Pediatric Dental Clinic at the University of L'Aquila (Italy), between October 2013 and March 2014. Children born after the 37th week were considered born at normal term; conversely, those born before the 37th week were considered preterm. Children's parents were asked to fill a specifically designed questionnaire, in order to obtain relevant information regarding our study aim. Ethics Committee of the University of L'Aquila (Italy) approved this study (Prot. n 1851 approved on 17th January 2014). Informed consent forms were obtained from parents or legal guardians prior to patient enrolment in the study. In all subjects, it was asked a careful perinatal anamnesis: our main interest was placed on the weight, length, and gestational age, mode of nursing (breastfeeding / bottle-feeding) and on the presence in the first months of life of gastro-esophageal diseases, diagnosed in agreement with the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGAN).[7]

Clinical assessment

Dental caries affections were clinically assessed, following the decayed, missing and filled teeth index (DMFT), in agreement with WHO criteria.[8]

Statistical analysis

Chi-square test and the study of Risks Ratio (RR) were used to determinate the association between preterm birth and other variables.

A multivariate logistic regression model evaluated the role of the analyzed variables in preterm birth. P-value <0.05 was considered statistically significant.

Data were processed through the statistical package SAS version 9.4.

Results

Initial selected sample involved 137 patients born in 2007 in the macro-area of central Italy. At birth, our recruited patients measured 76.6cm in length and 3048gr in weight. Out of 137 subjects, 13 (10.83%) showed teeth discoloration, 5 (3.7%) teeth agenesis, 9 (6.57%) *amelogenesis imperfecta* and 3 (2.22%) *dentinogenesis imperfecta*. Our data showed that 102 patients (75.56%) were nursed by breastfeeding. Instead, 33 patients (24.44%) were bottle-fed. 30 patients (21.89% of the whole sample) were affected from gastroesophageal reflux (GER).

The initial univariate logistic regression analysis (**Table 1**) was performed taking into consideration each parameter as an independent variable, in order to evaluate a hypothetical simultaneous association of GER with many of these variables.

Results reported in our research show that preterm birth is a risk factor related to GER, with values equal to Odds Ratio (OR) 2,0289 (95% confidence interval, 1.0463 to 3.9341). Moreover, we can statistically associate breastfeeding with GER, in fact these two variables showed an OR 2.8558 (95% confidence interval, 0.9256 to 8.8114). No statistical significance between preterm birth and specific oral pathologies was found.

In our data analysis, we corrected the initial model for the variables GER and preterm birth, by using a multivariate logistic regression model, in order to maintain each statistical analysis independent.

The new results also confirmed the hypothesis that preterm birth and breastfeeding are independently associated with GER. In fact, these data resulted independent but both significant, OR were found for preterm birth and breastfeeding with values respectively equal to 2,4731 (95% confidence interval, 1.0823 to 5.7086). Multivariate analysis, thus, strongly confirmed that the effect of preterm birth and breastfeeding independently increase the risk of GER (**Table 2**).

Table 1. Univariate Logistic Regression.

Risk Factors	*Relative Risk*	*Confidence Interval 95%*
Preterm Birth and Gastroesophageal Reflux	2.0289	1.0463 to 3.9341
Breastfeeding and Gastroesophageal Reflux	2.8558	0.9256 to 8.8114

Table 2. Multivariate Logistic Regression.

Risk Factors	*O.R.*	*Confidence Interval 95%*	*P Value*
Preterm Birth	2.4731	1.0823 to 5.7086	0.03 *
Breastfeeding	3.5065	0.9895 to 12.4265	0.0519 *

Discussion

This study was focused on the possible correlations between preterm birth and oral or systemic diseases. All previous similar studies were mainly focused on few factors, such as gestation time, socio-economic conditions of children' parents or on the typology of nursing. In 1997, an interesting longitudinal study[9] observed that children with low birth weight (<1500gr) developed severe enamel defects; on the other hands, the prevalence of caries in these subjects was not significant. In 2007, another study[10] reported an important correlation between respiratory distress syndrome and the presence of enamel hypoplasia in the deciduous teeth. In 2010, Cruvinel[11] claimed that the type of delivery and birth weight can represent a risk factor for the development of enamel hypoplasia. These studies were focused on several aspects that we have found to be not significant in our study: however, the composition of the sample is quite different between the compared researches.

Other factors such as social economic status and type of diet were not related to the onset of caries. In 2012 Rythèn[12,13] considered a slight relation between preterm birth and enamel hypoplasia. In 2013 Corrêa-Faria[4] reported that young aged mother (<24 years old) and breastfeeding represent a risk factor for the onset of developmental defects of enamel in children. In 1989, Bhat[14] focused his review on some factors never previously considered, such as gastroesophageal reflux and breastfeeding: his analysis showed that gastroesophageal reflux appeared to be one of the risk factors for the development of teeth discoloration and amelogenesis imperfecta. These results can be explained because of the acidity related to GER.[15]

This study for first focused the attention on the incidence of GER on other oral and dental diseases: in fact, the mineralization of tooth enamel is highly susceptible to intraoral PH changes.[15] Preterm children affected by GER had severe hypotonia of the sphincter.[16,17] This anatomical and functional deficiency dramatically impair the PH level in preterm children oral cavity, affecting negatively the enamel structure and the efficacy of saliva to contrast common oral infections.[18] These salivary and PH alterations may be able to create an altered oral environment, leading to a development of atypically aggressive dental pathologies.[19] Our results confirmed the association between GER and preterm birth, as well as GER and breastfeeding: in the light of what literature have showed about the damages related to untreated GER in paediatric patients, we solicit a special attention when dentists perform the anamnesis and the first visit to factors as the long-time breastfeeding and the preterm birth. An accurate oral control made on such patients reporting one or both these factors could make us able to early diagnose a GER, maybe able to start the onset of consequent oral pathologies.

Finally, we stress the concept highlighting the close cooperation between paediatricians and dentists: these figures are fundamental to jointly prevent many severe oral diseases.

Competing Interests

The authors have declared that no competing interest exists.

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