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Cruz Lopes, Leticia; Favoreto Silva, Amanda; Taiatella Siqueira Alves da Cruz, Izabela;
Calixto Fraiz, Fabian; Reichert da Silva Assunção, Luciana
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Original Article

Oral Findings in Brazilian Infants Born at Full Term

Letícia Cruz Lopes¹, Amanda Favoreto Silva¹, Izabela Taiatella Siqueira Alves da Cruz¹, Fabian Calixto Fraiz², Luciana Reichert da Silva Assunção²

¹DDS, Department of Stomatology, Universidade Federal do Paraná, Curitiba, PR, Brazil

²DDS, PhD, Department of Stomatology, Universidade Federal do Paraná, Curitiba, PR, Brazil

Author to whom correspondence should be addressed: Luciana Reichert da Silva Assunção, Universidade Federal do Paraná, Rua Lothário Meissner, Curitiba, PR, Brazil. 80210-170. Phone: +55 41 3360-4025. E-mail: lurassuncao@yahoo.com.br.

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Abstract

Objective: To evaluate the oral findings of Brazilian infants born at full term as well as to identify the presence of abnormalities at birth. **Material and Methods:** Cross-sectional study comprising 190 infants aged up to 2 days old. Data were obtained by applying a structured questionnaire to the mothers as well as by collecting information from the infants' medical records. Clinical examination was conducted to evaluate the infants' oral features and it included the relationship of alveolar ridges and shape of the gum pads and the insertion of the lingual and labial frenula. The presence of oral developmental abnormalities was also evaluated. Chi-square and Mann-Whitney U tests were used to analyze the infants' abnormalities and gender ($\alpha = 0.05$). **Results:** Most infants presented round upper gum pads (71.6%) and U-shaped lower one (52.6%). The mean discrepancy between the alveolar ridges was 3.33mm. Interference with tongue movement was found in 12.6% of the newborns. There was 50.0% prevalence of oral cysts. Among them, Epstein pearl was found in 27.4% of the cases, Bohn nodules in 26.3%, and dental lamina cysts in 11.1%. There was no significant difference between the occurrence of abnormalities and the infants' gender. The normal features of the oral cavity meet the literature data. The herein found congenital developmental abnormalities were oral cysts and ankyloglossia. **Conclusion:** Different classification forms made it difficult to compare the current study data with those from other studies. Therefore, it suggests the need for standardization in order to evaluate these abnormalities.

Keywords: Infant; Newborn; Congenital Abnormalities; Cysts; Lingual Frenum.

Introduction

Dentistry is constantly evolving and developing, and the healing phase has been increasingly replaced by health promotion. Thus, the care delivered to children in their first years of life becomes increasingly popular in dental sciences and it is based upon educational and preventive actions. Knowing how to recognize normal situations involving the oral cavity of children in their first years of life and, at the same time, identifying possible abnormalities is the role of health professionals.

During early childhood, the oral cavity is featured by several phenomena that constitute physiological responses, developmental abnormalities and even pathogens, and these phenomena create a unique and distinctive stomatognathic system in this time of life [1]. A wide variety of congenital abnormalities may occur in newborns oral cavity. Knowing them is of great importance to the effective diagnosis and treatment.

The oral features considered normal at birth include rounded maxilla and triangular-shaped mandible as well as the forward position of the maxilla in relation to the mandible. Some authors reported that this maxilla projection reaches over 90% of the cases and it may range from 0 to 7 mm [2]. In addition, the newborn shows structures that favor breastfeeding, such as the suction support on the upper lip, upper lip frenulum with low insertion and Robin and Magitot's fibrous cord [3].

The lack of proper lingual frenum development during the embryonic period may feature ankyloglossia, which could limit lingual mobility as well as the newborn's ability to breastfeed. Ankyloglossia prevalence is uncertain, but there are reports of an average from 0.88 to 12.8% [4], with greater predisposition in the male gender [5,6]. Differentiating the frenulum anatomical variations requires extensive anatomical knowledge about the tongue and the floor of the mouth to identify whether the anatomic findings may compromise the tongue movement and, consequently, the oral functions. Diagnosing ankyloglossia is not difficult because this anomaly is very visible [4].

Some congenital abnormalities are rarer and include congenital epulis and natal teeth [7,8]. Oral cysts, in turn, are common and their prevalence ranges between 56% and 99% [9,10]. These cysts consist of small asymptomatic papules, which may be yellowish white, white, or gray, and they may be considered remnants of embryonic structures. The most common cysts in newborns are: Bohn nodules, which are located in the vestibular, palatine or lingual portions of the gum pads; Epstein pearls, which are located along the median palatine raphe; and dental lamina cysts, which are located at the alveolar crest of the gingival ridge [11].

The current study aims to evaluate the oral findings of Brazilian newborns as well as to identify the main abnormalities found at birth, including the lingual frenum feature.

Material and Methods

The current study was approved by the Ethics Committee on Human Research of the Federal University of Paraná (Process n. 2025013.5.0000.0102). The infants' guardian read and signed the consent form.

This is a cross-sectional study, which involves a non-probabilistic sample comprising 190 newborns assisted at Maternity Vitor Ferreira do Amaral, Curitiba, PR, Brazil, from November 2013 to May 2014. The infants were examined up to 02 days after birth and the features to be analysed included normality oral patterns and/or the congenital oral abnormalities that could be found. All the children were born at full time term with a gestational age between 37 and 41 weeks.

The study excluded infants showing any clinical condition that could prevent the clinical examination - such as jaundice treatment, hospitalization in intensive care unit - as well as those who were agitated or who showed any discomfort during the exam.

Data were obtained using structured questionnaire, interviews and medical record information. The infants' data included gestational age, birth weight, gender, and type of delivery. Trained personnel recorded the birth weight information using a calibrated scale in the maternity facility.

A pilot study was initially conducted and the data collection tool was tested on 30 mothers in order to restructure and check the consistency of the questions. These mothers were not included in the final study sample.

Oral cavity clinical examination was performed according to recommendations by the World Health Organization [12]. Two examiners (LCL and AFS) were previously trained by evaluating 30 newborns. At this stage, all the steps related to clinical examination were included in the study.

The infants were examined under natural light using flashlight, children's plane mouth mirror and millimeter ruler to measure the discrepancy between jaws. Data were recorded on specific datasheet.

The were classified according to their maxillo-mandibular relationship, namely: lower alveolar ridge distal to the upper one, upper alveolar ridge distal to the lower one, edge-to-edge, distal lower alveolar ridge and posteriorly touching the upper one. Thus, this is an adapted classification of that suggested in the literature [13]. The labial frenulum insertion was analyzed according to the methodology previous describe [2].

Whenever ankyloglossia was detected, it was classified according to previous study [4]. These authors have created a lingual frenum evaluation protocol, which became mandatory in all Brazilian hospitals and maternity hospitals, according to Federal Law n. 13.002/14 enacted in 06.20.2014. The functional and anatomical evaluation of the tongue was performed, and - in the cases in which it was possible to see the lingual frenum - the scores were assigned according to features such as thickness, attachment to the sublingual face and to the floor of the mouth. When the sum of the scores was higher or equal to three, the frenulum interference in the tongue movement was taken under consideration [4].

The occurrence of other abnormalities such as congenital epulis, natal teeth and oral cysts was also analyzed. Oral cysts were classified, according to Fromm [14], as Bohn nodules, Epstein pearl and dental lamina cyst. In the case of cysts, the following aspects were considered: location

(anterior/posterior portion of the gum pads or palate; right/left side of the gum pads; upper/lower portions of the gum pads; median plane of the palate).

Data were tabulated and statistically analyzed using the Stata Statistics (SPSS for Windows, version 20.0, SPSS Inc., Chicago, IL, USA) software. Chi-square and Mann-Whitney U tests were used to analyze the infants' abnormalities and gender. The significance level adopted in all the analyses was 5%.

Results

Ninety-six (50.5%) out of the total examined newborns were boys. The mean birth weight was 3222.59 grams (SD = 467.57 grams), and most newborns (87.8%) showed birth weight between 2501 and 3999 grams. Natural birth was most frequent in 143 (75.3%) newborns. Approximately 48.4% of the mothers (n = 92) were aged between 22 and 29 years (Table 1).

Table 1. Data related to newborns included in the study and to their mothers. Curitiba, PR, 2014.

Variables	n*	%
Gender		
Male	96	50.5
Female	94	49.5
Weight (in grams) (mean: 3222.59 SD= 467.57)		
Higher or equal to 4000	13	6.9
2501 - 3999	166	87.8
Lower or equal to 2500	10	5.3
Type of delivery		
Natural	143	75.3
Cesarean section	47	24.7
Mother's age (in years) (mean: 24.86 SD = 5.15)		
Higher or equal to 30	42	22.1
22 - 29	92	48.4
Lower or equal to 21	56	29.5

*Values lower than 190 due to absence in the variable.

The normal findings observed in all the examined newborns are listed in Table 2. The round and "U" shapes were mostly observed in the upper and lower gum pads, respectively. The upper lip frenulum insertion was mostly observed at the alveolar ridge crest level in 79 (41.6%) newborns. According to results from the relationship of the alveolar ridges, 60.5% infants showed lower alveolar ridge distal to the upper one, and in 21.1% of the cases, they were posteriorly touching each other.

Table 2. Normality findings observed in the examined sample (n = 190). Curitiba, PR, 2014.

Variables	n	%
Upper gum pads		
Round	136	71.6

U shape	51	26.8
V shape	3	1.6
Lower gum pads		
Round	86	45.2
U shape	101	53.1
V shape	3	1.6
Labial frenulum insertion		
Palatine papilla	75	39.5
Alveolar ridge crest	79	41.6
Upper to the alveolar ridge crest	36	18.9
Alveolar ridges relationship		
Lower alveolar ridge distal to the upper one	115	60.5
Upper alveolar ridge distal to the lower one	1	0.5
Edge-to-edge	10	5.3
Distal lower alveolar ridge and posteriorly touching the upper one	40	21.1
Edge-to-edge and posteriorly touching each other	24	12.6

It was possible to analyze the discrepancy in the horizontal relationship between the alveolar ridges of 156 infants. This relationship ranged between -2 and 7 mm, 3.33 mm in average (SD = 1.38). The mean discrepancy between the maxilla and the mandible was 3.42 mm (SD = 1.56) in boys and 3.25 mm (SD = 1.18) in girls ($P = 0.262$).

All the newborns in the present study presented the following oral features: the presence of lobes, bulging and Robin and Magitot's fibrous cord.

Table 3 shows the results from the lingual frenum and its insertion. It was possible to see the lingual frenum in 67.4% of all the examined newborns, and the thin thickness was the most prevalent (90.6%). The attachment to the floor of the mouth was found at the sublingual caruncles level in 80.5% of the cases. The attachment to the tongue's ventral face was most frequent in the median plane (69.5%). Interference in the tongue movements as well as anatomical and functional limitations were identified in 24 (12.6%) newborns. There was no statistically significant difference between the frenulum interference in the tongue movements and the infants' gender ($P = 0.413$).

Table 3. Lingual frenum features in the examined samples (n = 190). Curitiba, PR, 2014.

Variables	n	%
Visualization		
Possible to visualize	128	67.4
Not possible to visualize	62	32.6
Thickness		
Thin	116	90.6
Thick	12	9.4
Attachment to the floor of the mouth		
Caruncles	103	80.5
Lower alveolar crest	25	19.5

Attachment to the tongue

Median plane	89	69.5
Between the median plane and the apex	31	24.2
Apex	8	6.3

Movement interference

No	166	87.4
Yes	24	12.6

There were no congenital epulis and natal teeth cases. Oral cysts were observed in 95 (50.0%) newborns, without gender prevalence ($P = 0.772$). Epstein pearl was the most prevalent oral cyst found in 52 (27.4%) newborns. It was followed by Bohn nodule in 50 (26.3%), and by dental lamina cysts in 21 (11.1%) newborns. Epstein pearls were most often found in the posterior region of the palatine raphe (65.4%), and they were followed by the anterior region (17.3%) and by the same frequency in both regions (17.3%). Oral cysts and Bohn nodules location is shown in graph. The upper and the anterior portion and the right side of the gum pads were the most common regions for the occurrence of Bohn nodules and dental lamina cysts. Bohn nodules were also mostly found in the vestibular region (94.1%) (Figure 1). Seventy (70) newborns (36.8%) showed gingival-origin cysts.

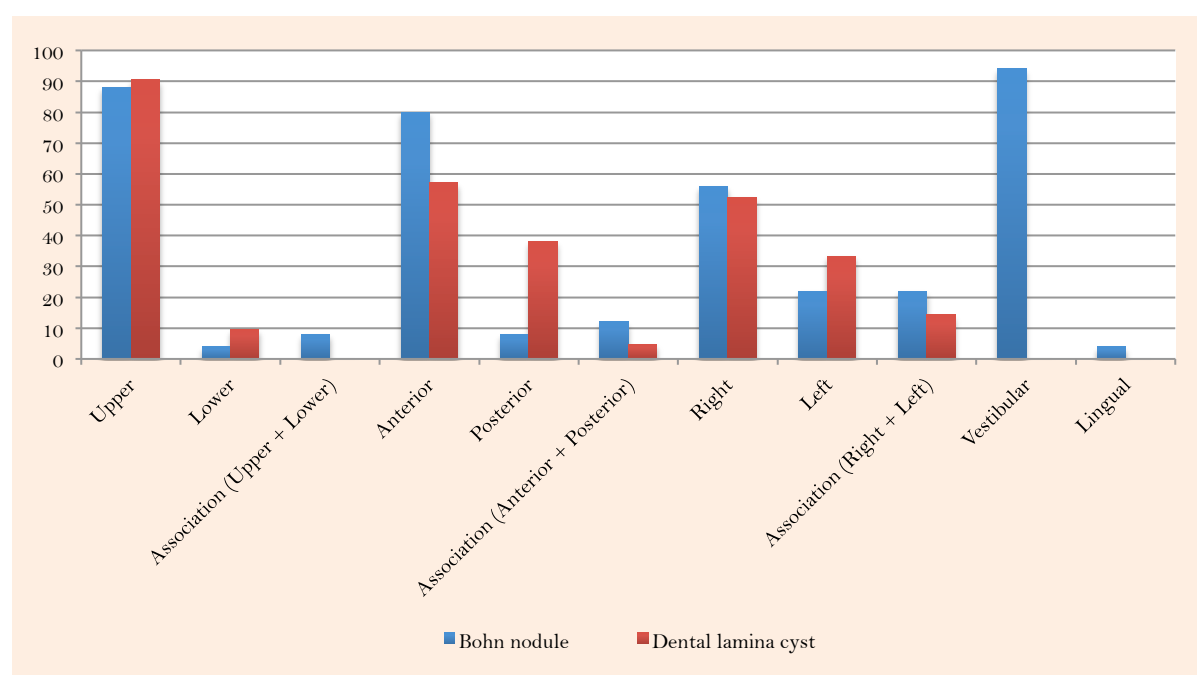


Figure 1. Distribution (in percentage) of the Bohn nodules and dental lamina cysts locations observed in the examined sample (n = 190). Curitiba, PR, 2014.

Discussion

The oral cavity of newborns presents several anatomical accidents and structural abnormalities inherent to their age. Differently from the mandible, which shows almost triangular shape at birth, the maxilla shows round U-shape [15]. Results in the current study showed that the

upper gum pads had round shape in 71.6% of the cases. The lower gum pads had "U" shape in 53.1% of the examined newborns.

The upper lip frenulum plays an important role in breastfeeding, since it enables upper lip sealing on the breast during suction. Some authors [2] applied the same methodology used in the current study to a study on Indian infants. They found lip frenulum insertion in the upper portion to the gingival ridge crest in 68.7% of the sample. On the other hand, results in the current study showed higher labial frenulum insertion frequency (41.6%) in the alveolar ridge crest. Previous study [16] reported upper lip frenulum insertion in the palatine papilla in 25% of the newborns. According to results in the present study, there was 39.5% prevalence of newborns with labial frenulum insertion in the palatine papilla.

As for the maxillo-mandibular relationship between the alveolar ridges, results in the current study showed that 81.6% of the newborns presented lower alveolar ridge distal to the upper one, and that only 21.1% of them posteriorly touched each other. Seventeen point nine percent (17.9%) showed alveolar ridges in edge-to-edge relationship, and only one case showed maxilla distal to the mandible. Similar results were found in a study that examined 1021 Swedish newborns and that reexamined them after 2-3 and 4-5 months. In this study, the anteroposterior jaw relationship between the alveolar ridges was distal to the mandible in 99% of the cases. Later in the re-examination, the authors found decrease to 97.6% in the distal relationship. Since open bite was configured when, with the alveolar ridges in contact, there was vertical space between them in their anterior segments, the authors found 406 children (39.8%) presenting alveolar ridges with modified vertical relationship, i.e., with anterior open bite [13]. Some researchers [17] stated that the type of anterior relationship between the alveolar ridges at birth is irrelevant to normal occlusion development. On the other hand, the anterior open bite might be favorable to further normal occlusion development [18].

The discrepancy found in the horizontal relation between the alveolar ridges may range from 0 to 7 mm [2]. Results in the current study showed mean discrepancy of 3.42 mm for boys and 3.25 mm for girls. Previous work [19] found mean overjet of 4.5 mm in the male gender and 4.1 mm in the female gender. The present study found discrepancy above 6 mm in 37 (18.5%) of the examined newborns. Sillman [19] reported discrepancy above 6 mm in 23 (24.7%) newborns.

Congenital developmental abnormalities are commonly found in 0-6-month-old infants. They are mostly benign and do not require specific treatment [1]. The abnormalities found at birth may vary from the presence of oral cysts to rarer conditions such as epulis and natal teeth. The prevalence of these abnormalities may occur in approximately 21% of the newborns [1]. Although most of these abnormalities do not present imminent risk to the infants' health, some of them, such as natal teeth and ankyloglossia, may significantly affect the breastfeeding process [5].

Breastfeeding is directly related to sucking and swallowing functions, in coordination with breathing. Since sucking and swallowing depend on tongue movements, any abnormality may result in functional impairment. Difficulties in breastfeeding may lead to early weaning [5].

Frenulum interference in the tongue movement was observed in 12.6% of the evaluated cases, regardless of the infants' gender. Studies reported from 1.8% to 4.8% prevalence among boys [6]. It is difficult to perform a comparative analysis with other studies due to the different methods used to assess ankyloglossia [4]. As far as it is known, the current study is the first in the dentistry field using the methodology suggested previously [4]. These authors suggested a protocol based on score attribution to evaluate lingual frenum in infants. They considered this protocol an effective tool to assess lingual frenum interference in the tongue movements. Ankyloglossia may lead to difficulties at breastfeeding and to future speech disorders [5]. Contrary to the present study, some authors [5,20] state that gender and ankyloglossia are related, and that boys show greater lingual frenum attachment.

The present study found no congenital epulis and natal teeth cases. Congenital epulis is a lesion of rare recurrence [21]. It shows benign behavior without metastasis and recurrence [7,21]. Natal teeth are also low-incidence conditions that range from approximately 1:2000 to 1:3500 births [22]. This condition is defined as being the presence of teeth at birth. These teeth usually have heightened mobility due to small root development, and they are attached to the gingival tissues by their coronal part alone [8]. Intervention is indicated when they are supernumerary, with high mobility degree, or when they hinder breastfeeding [8,23]. The null frequency of congenital epulis and natal teeth cases in the current study may have been determined by the small sample size due to the low prevalence of these conditions in other populations.

Oral cysts do not require specific treatment because they do not grow in size and they regress spontaneously within a few weeks or months [9,13]. There are several ways to classify these cysts, since their names may change according to their place of origin or location in the oral cavity. It leads to several studies with varied results. The current study used the nomenclature based on the location of each cyst suggested by Fromm [14].

A total of 50.5% of the newborns showed some type of oral cyst. Similar results were found in a sample comprising Spanish newborns [10]; 63.7% of them showed cysts in the oral cavity. However, another study [1] found only 7.5% prevalence of oral cysts in newborns. On the other hand, some authors [24,25] found 80% and 94% prevalence of oral cysts in newborns, respectively. These different values may occur due to different evaluation methods, racial differences and to the different definitions of oral cysts [25].

Dental lamina cysts were found in 10% of the examined newborns. Bohn nodules were found in 50 infants (26.3%). Several authors classified Bohn nodules and dental lamina cysts as being a single entity [2,25,26], namely: gingival or alveolar cysts. According to these authors, the prevalence of gingival-origin cysts may range between 13.8% and 79%. The current study found 36.8% of gingival-origin cysts.

Epstein pearls are clinically featured as circumscribed, white, nodular, submucosal or mucosal lesions often located on the alveolar ridge or on the hard palate midline [9]. Some researchers [2] conducted a study on Indian newborns and they found 32.5% prevalence of this

abnormality. The current study found 27.4% prevalence of Epstein pearls. However, a study conducted on Taiwanese newborns [25] reported 86% of the cysts located on the palate.

The normal features found in the herein examined newborns meet data found in the literature. Ankyloglossia and oral cysts were the only developmental abnormality found among the examined newborns. However, the different classification forms make it difficult to compare our data to those from other studies. It suggests the need for standardization in order to evaluate these abnormalities.

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