

Original articles

Prevalence of ankyloglossia and factors that impact on exclusive breastfeeding in neonates

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ABSTRACT

Objective: to determine the prevalence of ankyloglossia in neonates and verify factors that interfere with exclusive breastfeeding and cause difficulties in breastfeeding.

Methods: an observational longitudinal study conducted at a public maternity hospital in Teresina, Piauí, Brazil. The sample comprised 397 mother-child pairs. Ankyloglossia was diagnosed with the part I of the Baby Lingual Frenulum Assessment Protocol with Scores. Six months after the children were born, the mothers were interviewed and answered questions on the indication and performance of frenotomy and time of breastfeeding. Descriptive analysis of the data, chi-square test and bivariate and multivariate Poisson regression were conducted ($p < 0.05$).

Results: the prevalence of ankyloglossia was 4.3% ($n = 17$). The attendance rate for the second moment of the research was 70.8% ($n = 281$). Of the examined children, 14 were indicated for lingual frenotomy, but only one was submitted to the procedure. The time of exclusive breastfeeding of children with ankyloglossia was equal to that of children with a normal lingual frenulum (p -value = 0.876). Ankyloglossia was not associated with breastfeeding difficulties (PR = 1.0 95%CI 0.8-1.1, p -value = 0.441), neither was it a factor for not breastfeeding exclusively for 6 months (PR = 1.1 95%CI 0.9-1.2, p -value = 0.390).

Conclusions: the prevalence of ankyloglossia in the studied population was 4.3%. Baby bottle use in the first month of life and breastfeeding difficulties were hindering factors for exclusive breastfeeding.

Keywords: Ankyloglossia; Infant, Newborn; Breast Feeding

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INTRODUCTION

The lingual frenulum is a median dense fibrous connecting fold, comprised of a connective tissue and, sometimes, upper fibers of the genioglossus muscle, extending from the inferior surface of the tongue to the floor of the mouth¹. The tongue is very important in suction, speech, and feeding². Occasionally, the process separating the tongue from the floor of the mouth fails, and the lingual frenulum restricts its movement, which is characterized as ankyloglossia³.

For decades, there have been heated debates on whether a baby's abnormal lingual frenulum negatively interferes with the establishment and maintenance of adequate breastfeeding practices. Hence, it has been hypothesized that ankyloglossia may decrease infants' and babies' capacity to maintain latch and tongue compression against the nipple, interrupting or hindering effective milk flow, impairing the babies' weight gain, and increasing the mothers' discomfort when breastfeeding^{4,5}.

The prevalence of ankyloglossia ranges from 0.88% to 16.0%⁶⁻⁸. It has been mandatory, since 2014, to screen neonates for ankyloglossia in all hospitals and maternities in Brazil, which has been provided by Law 13.002/2014^{6,9}.

The impact of ankyloglossia on breastfeeding has been exhaustively researched in the fields of pediatrics, pediatric dentistry, and speech-language-hearing sciences – which are specialties that often deal with such condition^{1,4,6}. In general, this issue is debatable among health professions and multidisciplinary teams, particularly when discussing its influence on breastfeeding⁷.

Hence, the objective of this study was to determine the prevalence of ankyloglossia in neonates and verify the factors that interfere with exclusive breastfeeding and cause difficulties in breastfeeding.

METHODS

This was an observational longitudinal study that assessed the lingual frenulum of neonates at a maternity hospital in Teresina, Brazil, and the clinical history reported by their mothers.

The study was conducted between August 2019 and September 2020, after approval of the Research Ethics Committee of the Municipal Health Foundation in Teresina (protocol number 002/2019) and acquiescence of the Research Ethics Committee of the São Leopoldo Mandic College (protocol CAEE

106392.3.0000.5374), complying with the ethical and scientific requirements of Resolution 466/2012 of the National Health Council (CNS, in Portuguese) – (Norms for Human Research). All research subjects signed an informed consent form, and none of them expressed any negative remarks about participating in the study.

The data were collected at the Wall Ferraz Municipal Maternity Hospital, which is acknowledged as a reference center for pregnant women's and neonates' healthcare and obstetric and neonatal emergencies, meeting the principles and guidelines of the Public Health System (SUS, in Portuguese).

The sample calculation considered the average 2,300 babies born yearly at the maternity and the 16.0% prevalence of ankyloglossia^{6,8,10}. The parameters used were 95% significance level, 3.5% sample error, and 15% addition to compensate for possible losses. The final sample should comprise 411 mother/baby pairs, which were recruited by convenience.

The inclusion criteria were as follows: healthy babies of both sexes, born at full-term, 1-minute Apgar higher than 7, and minimum 2,500 grams birth weight. Premature neonates and/or with perinatal complications, diagnosed with genetic syndromes, neurological disorders, motor impairments, or any factor that might hinder breastfeeding were excluded from the study. The data on inclusion and exclusion criteria were obtained from the medical records stored at the said maternity.

Data were collected by clinically examining the neonates' oral cavity with the Baby Lingual Frenulum Assessment Protocol with Scores⁶ and administering a questionnaire to the mothers after the baby was 6 months old.

The oral cavity clinical examination was conducted by a single previously trained pediatric dentist with extensive experience with baby dentistry. The baby was laid down on their cribs and the examiner stood by it, initially verifying the presence of lip closure. A tongue elevation maneuver with the index fingers was performed to fully visualize the lingual frenulum, the aspect of the tip of the tongue, the frenulum fixation on the tongue and the floor of the mouth (visible from the sublingual caruncles or the inferior alveolar ridge), frenulum thickness, whether the frenulum was visible or a second maneuver would be necessary, whether the baby could stick the tongue out of the mouth, and lastly the position of the tongue when crying. Cotton rolls or gauze were used to dry up the region and conduct the lingual frenulum assessment diagnosis. The examiner wore procedure goggles, mask, hair cap, and gloves

and was assisted by a volunteer, who held a flashlight to light up the examined area¹¹.

The presence of ankyloglossia was established first using part I of the protocol⁶. This part assesses lip posture at rest; tongue positioning tendency when crying; the shape of the lifted tip of the tongue when crying, and lingual frenulum (visibility, thickness, fixation on the sublingual surface and the floor of the mouth). The sum of the final results indicates a NORMAL frenulum when scores are ≤ 4 ; scores 5 and 6 indicate an UNCERTAIN frenulum; scores ≥ 7 indicate an ABNORMAL frenulum, according to the recommendations in the Neonatal Tongue Screening Test booklet¹².

An appointment was scheduled for 30 days after the examination for neonates who scored 5 or 6 when the complete protocol was applied. Those who scored ≥ 7 were referred to the Center for Dental Specialties (CDS) for surgical intervention. Hence, the cutoff score to estimate the prevalence of ankyloglossia in this study sample was 7.

After the babies were 6 months old, the mothers were contacted by the lead researcher via phone call. They answered a semi-structured questionnaire^{13,14} on their sociodemographic profile (age, occupation, educational attainment, and housing conditions), smoking, alcohol use, type of delivery, type of nipple, presence or not of postpartum depression, time of exclusive breastfeeding (EBF), mother's level of knowledge and expectation of EBF, pacifier or baby bottle use in the first month of life, an indication of frenotomy, and whether the surgery had been made.

The mothers were also asked about difficulties breastfeeding. The questions included reports on frequent choking and tongue clicking when the infant was breastfeeding; excessive fatigue when breastfeeding; latch difficulties; infants' irritability and restlessness when breastfeeding, either alone or in combination with brief breastfeeding and frequent crying; and low milk flow combined with latch difficulties. In the case of affirmative answers to at least one

of these questions, the mother was considered to have difficulties breastfeeding³.

The data were analyzed with the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA, version 20.0). Difficulties breastfeeding and 6-month EBF were dependent variables. Socioeconomic and demographic variables and ankyloglossia were independent variables.

Descriptive analysis of the data was conducted with values presented in absolute frequencies, percentages, mean and standard deviation, median, and minimum and maximum values. The chi-square and Mann-Whitney tests were used, and significance was set at $p < 0.05$.

Poisson stepwise regression with robust variance was used to determine associations between difficulties breastfeeding and 6-month EBF and the independent variables. The association magnitude was assessed with adjusted and unadjusted prevalence ratios (PR), 95% confidence intervals, and p-values. Variables whose p-values were ≤ 0.20 in the univariate analysis were included in the adjusted model. Only variables with a p-value < 0.05 remained in the final model.

RESULTS

Invitations were extended to 411 mother-baby pairs. However, after applying the eligibility criteria, 397 mother-baby pairs were interviewed and examined within 48 hr from birth. The sample was recruited by convenience.

Of the 397 mothers, 70.8% participated in the second phase of the research. They answered various questions, whose data are described in Tables 1 and 2. The mothers were young, as 54.9% of them were less than 25 years old; 57.4% answered that the delivery was uneventful; 59.4% had normal delivery; and 97.5% did not report any complication in childbirth. Most of those who already had a child managed to breastfeed for 6 months. Also, 34.5% of the mothers reported difficulties breastfeeding, and 4.0% of the mothers had non-protruded nipples (Table 1).

Table 1. Profile of mothers of neonates born at a municipal maternity hospital in Teresina, Piauí, Brazil (N = 397)

	n	%
Age		
<18 years	34	8.6
Between 18 and 25 years	184	46.3
>25 years	179	45.1
Place of residence		
Capital	274	69.0
Inland	123	31.0
Delivery		
Uneventful	228	57.4
Complicated	54	13.6
Did not respond	115	29.0
Type of delivery		
Normal	236	59.4
Cesarean section	161	40.6
Delivery complications		
Yes	10	2.5
No	387	97.5
Type of nipple		
Protruded	381	96.0
Non-protruded	16	4.0
Had breastfed a first child for 6 months		
Yes	195	49.1
No	38	9.6
Did not have a previous child	164	41.3
Difficulties in breastfeeding		
Yes	137	34.5
No	260	65.5
Total	397	100.0

Of the children assessed, 56.4% were females; 98.0% did not have any non-nutritive habit within 48 hr of birth, and 2.5% were already complementing their

diet with infant formula. Only 40.1% of the children were on EBF for 6 months (Table 2).

Table 2. Profile of neonates born at a municipal maternity hospital in Teresina, Piauí, Brazil (n = 397)

	n	%
DATA OBTAINED AT BIRTH		
Sex		
Males	173	43.6
Females	224	56.4
Habits		
Pacifier	1	0.3
Finger	7	1.8
None	389	98.0
Complementary feeding		
Expressed milk	26	6.5
Artificial milk	10	2.5
None	361	90.9
Type of lingual frenulum		
Normal	380	95.7
Ankyloglossia	17	4.3
Total	397	100.0
DATA OBTAINED AFTER 6 MONTHS OLD		
Pacifier use in the first month of life		
Yes	33	8.3
No	248	62.5
Baby bottle use in the first month of life		
Yes	35	8.8
No	246	62.0
Exclusive breastfeeding for 6 months		
Yes	159	40.1
No	122	30.7
Total	281	70.8

The prevalence of ankyloglossia was 4.3%, as described in Table 2. The babies with ankyloglossia were referred to the CDS for lingual frenotomy, although only one (0.3%) child was submitted to the procedure. Of the 17 children diagnosed with ankyloglossia, the mothers of three could not be reached after 6 months. As for the other 14, seven were on EBF for 6 months; one, for 5 months; two for 4 months; one for 3 months; two for 2 months, and one for 1 ½ month. The time of EBF of children with ankyloglossia (median = 6 months) was equal to that of children with a normal

tongue (median = 6 months, Mann-Whitney test; p-value = 0.876). Only one child had used baby bottles and three had used pacifiers in the first month of life. Nipple pain was self-reported by five mothers.

EBF was significantly associated with breastfeeding difficulties (p-value < 0.001), pacifier use (p-value < 0.001), and baby bottle use (p-value < 0.001) in the first month of life. On the other hand, occurrence of ankyloglossia in the neonates was not associated with EBF (p-value = 0.779) (Table 3).

Table 3. Association between exclusive breastfeeding and mothers' and neonates' characteristics, type of delivery, mothers' characteristics, and occurrence of ankyloglossia in neonates born at a municipal maternity hospital in Teresina, Piauí, Brazil (n = 281)

	Exclusive breastfeeding		p-value	PR (95%CI)
	No n (%)	Yes n (%)		
Formal occupation			0.101	
Yes	32 (52.5)	29 (47.5)		1.0 (0.9-1.2)
No	90 (40.9)	130 (59.1)		1
Maternity leave			0.222	
Yes	32(50.0)	32(50.0)		1.1 (0.9-1.2)
No	90(41.5)	127(58.5)		1
Mother's educational attainment				
< 8 years	18(46.2)	21(53.8)	0.878	1.0 (0.8-1.1)
From 8 to 11 years	82(41.8)	114(58.2)	0.458	0.9 (0.8-1.1)
> 11 years	22(47.8)	24(52.2)		1
Smoking			0.592	
Yes	10(38.5)	16(61.5)		1.0 (0.8-1.1)
No	112(43.9)	143(56.1)		1
Alcohol use			0.336	
Yes	49(47.1)	55(52.9)		1.0 (0.9-1.1)
No	73(41.2)	104(58.8)		1
Other substances			0.188	
Yes	2(100.0)	0(0.0)		1.4 (1.0-1.5)
No	120(43.0)	159(57.0)		1
Monthly family income				
Up to 2 minimum wages	117(45.0)	143(55.0)	0.565	1.1 (0.8-1.4)
2 to 4 minimum wages	3(20.0)	12(80.0)	0.531	0.9 (0.6-1.2)
> 4 minimum wages	2(33.3)	4(66.7)		1
Instructed on benefits of breastfeeding			0.087	
Yes	75(39.9)	113(60.1)		0.9 (0.8-1.0)
No	47(50.5)	46(49.5)		1
At hospital discharge, believed her milk was enough to feed the baby			0.262	
Yes	94(41.8)	131(58.2)		0.9 (0.8-1.0)
No	28(50.0)	28(50.0)		1
Pacifier use in the first month of life			<0.001	
No	99(39.9)	149(60.1)		1.2 (1.3-1.7)
Yes	23(69.7)	10(30.3)		1
Baby bottle use in the first month of life			<0.001	
No	95(38.6)	151(61.4)		1.3 (1.2-1.5)
Yes	27(77.1)	8(22.9)		1
Symptoms of postpartum depression			0.599	
Yes	13(48.1)	14(51.9)		1.0 (0.9-1.2)
No	109(42.9)	145(57.1)		1
Mother's age				
< 18 years	11(55.0)	9(45.0)	0.119	1.1 (0.9-1.3)
Between 18 and 25 years	58(48.7)	61(51.3)	0.061	1.1 (0.9-1.2)
> 25 years	53(37.3)	89(62.7)		1
Difficulties in breastfeeding			<0.001	
No	34(20.7)	130(79.3)		1.4 (1.3-1.5)
Yes	88(75.2)	29(24.8)		1

	Exclusive breastfeeding		p-value	PR (95%CI)
	No n (%)	Yes n (%)		
Type of nipple			0.131	
Protruded	115(42.6)	155(57.4)		0.9 (0.7-1.0)
Non-protruded	7(63.6)	4(36.4)		1
Previous breastfeeding experience			0.095	
Yes	53(38.4)	85(61.6)		0.9 (0.8-1.0)
No	69(48.3)	74(51.7)		1
Place of residence			0.930	
Capital	85(43.6)	110(56.4)		1.0 (0.9-1.1)
Inland	37(43.0)	49(57.0)		1
Place of prenatal care				
Capital	88(43.8)	113(56.2)	0.442	0.9 (0.7-1.2)
Inland	31(41.3)	44(58.7)	0.385	0.9 (0.7-1.2)
Another state	3(60.0)	2(40.0)		1
History of tongue-tie in the family			0.486	
Yes	17(38.6)	27(61.4)		1.0 (0.9-1.1)
No	105(44.3)	132(55.7)		1
Ankyloglossia			0.779	
Yes	6(40.0)	9(60.0)		1.0 (0.8-1.2)
No	116(43.6)	150(56.4)		1
Type of delivery			0.177	
Cesarean section	44 (38.6)	70 (61.4)		0.9 (0.8-1.0)
Normal	78 (46.7)	89 (53.3)		1
Upper frenulum insertion				
Normal	99(42.5)	134(57.5)	0.695	1.0 (0.9-1.2)
Middle insertion	17(53.1)	15(46.9)	0.306	1.1 (0.9-1.4)
Low insertion	6(37.5)	10(62.5)		1
Sex of the baby			0.201	
Males	49(39.2)	76(60.8)		0.9 (0.8-1.0)
Females	73(46.8)	83(53.2)		1
Total	122 (43.4)	159 (56.6)		

Chi-square test; PR = prevalence ratio; 95%CI = 95% confidence interval

In multiple regression, it was observed that babies who used baby bottles in the first month of life were more likely to not be exclusively breastfed for 6 months (PR = 1.2 95%CI 1.1-1.3) than those who did not use

them. Also, the mothers who had difficulties breastfeeding were more likely to not breastfeed exclusively for 6 months (PR = 1.4 95%CI 1.3-1.5) than those who did not have such difficulties (Table 4).

Table 4. Bivariate and multivariate Poisson regression analysis of exclusive breastfeeding

	Bivariate analysis		Adjusted model	
	PR (95%CI)	p-value	PR (95%CI)	p-value
Pacifier use in the first month of life**				
Yes	1.2 (1.3-1.7)	<0.001	1.1 (0.9-1.2)	0.197
No	1		1	
Baby bottle use in the first month of life**				
Yes	1.3 (1.2-1.5)	<0.001	1.2 (1.1-1.3)	0.008
No	1		1	
Difficulties in breastfeeding**				
Yes	1.4 (1.3-1.5)	<0.001	1.4 (1.3-1.5)	<0.001
No	1		1	
Ankyloglossia*				
Yes	1.0 (0.8-1.2)	0.779	1.1 (0.9-1.2)	0.390
No	1		1	

95%CI = 95% confidence interval

Caption: PR = Prevalence ratio

The bivariate analysis shows an association between breastfeeding difficulties with the type of the nipple (p-value < 0.001), previous breastfeeding experience (p-value = 0.011), 6-month EBF (p-value < 0.001),

and pacifier use (p-value < 0.001) and baby bottle use (p-value < 0.001) in the first month of life. On the other hand, breastfeeding difficulties were not associated with ankyloglossia (p-value = 0.266) (Table 5).

Table 5. Association between difficulties breastfeeding and mothers' and neonate's characteristics and occurrence of ankyloglossia in neonates born at a municipal maternity hospital in Teresina, Piauí, Brazil

	Breastfeeding difficulties		p-value ⁺	unadjusted PR (95%CI)
	Yes n (%)	No n (%)		
Type of delivery*				
Cesarean section	57 (35.4)	104 (64.6)	0.908	1.0 (0.9-1.1)
Normal	80 (33.9)	156 (66.1)		1
Type of nipple*				
Non-protruded	11(68.8)	5(31.2)	<0.001	1.5 (1.3-1.7)
Protruded	126(33.1)	255(66.9)		1
Previous breastfeeding experience*				
No	82(40.6)	120(59.4)	0.011	1.2 (1.1-2.6)
Yes	55(28.2)	140(71.8)		1
Breastfed exclusively for 6 months**				
No	88(72.1)	34(27.9)	<0.001	1.5 (1.3-1.6)
Yes	29(18.2)	130(81.8)		1
Pacifier use in the first month of life**				
Yes	23(69.7)	10(30.3)	<0.001	1.2 (1.1-1.4)
No	94(37.9)	154(62.1)		1
Baby bottle use in the first month of life**				
Yes	23(65.7)	12(34.3)	0.001	1.2 (1.1-1.3)
No	94(38.2)	152(61.8)		1
Symptoms of postpartum depression**				
Yes	15(55.6)	12(44.4)	0.110	1.1 (0.9-1.3)
No	102(40.2)	152(59.8)		1

	Breastfeeding difficulties		p-value ⁺	unadjusted PR (95%CI)
	Yes n (%)	No n (%)		
Mothers' age*				
< 18 years	13(38.2)	21(61.8)	0.591	1.0 (0.9-1.2)
Between 18 and 25 years	63(34.2)	121(65.8)	0.342	1.0 (0.9-1.1)
> 25 years	61(34.1)	118(65.9)		1
Upper frenulum insertion*				
Medium insertion	16(38.1)	26(61.9)	0.683	1.0 (0.9-1.1)
Low insertion	13(44.8)	16(55.2)	0.261	0.9 (0.7-1.1)
Normal	108(33.1)	218(66.9)		1
Place of residence*			0.316	
Capital	101(36.9)	173(63.1)		1.0 (0.9-1.1)
Inland	36(29.3)	87(70.7)		1
Sex of the baby*			0.324	
Males	60(34.7)	113(65.3)		0.9 (0.8-1.0)
Females	77(34.4)	147(65.6)		1
Ankyloglossia*			0.266	
Yes	8(47.1)	9(52.9)		0.9 (0.8-1.1)
No	129(33.9)	251(66.1)		1

*total n = 397; **total n = 281; + Chi-square test

95%CI = 95% confidence interval

Caption: unadjusted PR = unadjusted prevalence ratio

After the bivariate analysis, the Poisson regression showed that mothers with non-protruded nipples were more likely to have difficulties breastfeeding (PR = 1.3 95%CI 1.1-1.6) than mothers with protruded nipples.

Also, children who were not on EBF for 6 months were more likely to have difficulties breastfeeding (PR = 1.4 95%CI 1.3-1.5) than those who were on 6-month EBF (Table 6).

Table 6. Bivariate and multivariate Poisson regression analysis of difficulties breastfeeding with mothers' and neonates' characteristics and occurrence of ankyloglossia in neonates born at a municipal maternity hospital in Teresina, Piauí, Brazil

	Bivariate analysis		Multiple analysis	
	unadjusted PR (95%CI)	p-value	unadjusted PR (95%CI)	p-value
Type of nipple*				
Non-protruded	1.5 (1.3-1.7)	<0.001	1.3 (1.1-1.6)	<0.001
Protruded	1		1	
Previous breastfeeding experience*				
No	1.2 (1.1-2.6)	0.011	1.0 (0.9-1.1)	0.193
Yes	1		1	
Exclusive breastfeeding for 6 months**				
No	1.5 (1.3-1.6)	<0.001	1.4 (1.3-1.5)	<0.001
Yes	1		1	
Ankyloglossia*				
Yes	0.9 (0.8-1.1)	0.266	1.0 (0.8-1.1)	0.449
No	1		1	

Adjusted model for pacifier use in the first month of life and symptoms of postpartum depression

95%CI = 95% confidence interval

Caption: PR = prevalence ratio

DISCUSSION

Scientific evidence has demonstrated the relevance of breastfeeding to benefit children's health, especially to reduce child mortality and potentially prevent chronic diseases and conditions. Moreover, breastfeeding is known to influence children's development and its consequences to adulthood¹⁵⁻¹⁷.

Thus, there is a noticeable increasing unquietness concerning factors associated with interrupted breastfeeding – among which, ankyloglossia stands out as a possible influencing agent in breastfeeding. Therefore, it is convenient to verify the prevalence of ankyloglossia and whether this condition impacts EBF, which are the scopes of this study.

Despite the variations in ankyloglossia diagnosis and its unstandardized criteria, the prevalence observed in this study population was 4.3%. This value is within the variation interval found in the references consulted⁶⁻⁸.

Of the 17 children who presented with ankyloglossia in neonatal screening and were referred to the CDS for lingual frenotomy, only one was submitted to the surgery.

The results of this study did not show an association between ankyloglossia and difficulties breastfeeding, as the time of EBF of children with ankyloglossia was similar to that of children diagnosed with a normal frenulum. This was also observed in research conducted in different fields of health^{18,19}. In this regard, it should be considered that being on EBF does not mean the baby does not have difficulties breastfeeding. Randomized clinical trials in the literature point to the interference of ankyloglossia in breastfeeding^{20,21}.

Breastfeeding difficulties, such as nipple pain and cracks, breast engorgement, and breast refusal by the baby, are present in up to 80% of the reports of mothers whose babies have ankyloglossia²². In the present paper, half of the children with ankyloglossia (7) were on 6-month EBF; other children (3) were on EBF for 4 months, and when their mothers were asked about early weaning, they ascribed it to going back to work and babies' refusal; some mothers (5) reported pain and discomfort in the nipple only in the beginning of the process.

The low adherence to frenotomy and the verification that ankyloglossia did not interfere with the time of EBF in the studied sample suggest that abnormal frenula do not always interfere with suction and swallowing^{10,23,24}. This reinforces the need for individually following up each case²⁴. On the other hand, it must be highlighted that lingual frenotomy reduces nipple pain and

improves the children's breastfeeding and swallowing process¹⁹⁻²⁵.

Although the results found in the studied populations did not indicate a hindering factor in breastfeeding, a rigorous clinical follow-up is indispensable, since untreated ankyloglossia may impact orofacial growth, nighttime mouth-breathing, and speech^{5,26}.

The results show that 40.1% of the babies were on 6-month EBF. This proportion is near the one verified in the II Breastfeeding Prevalence Survey conducted in Brazilian capital cities and the Federal District, which was 40.7%²⁷. Similar research found rates ranging from 12.7 to 50.1%^{13,17,18} EBF in 6-month-old children.

Even though EBF is the gold standard feeding in the first 6 months of life^{26,28,29}, its success involves a complex process. Besides the mother's willingness to breastfeed, it is influenced by biological, social, cultural, economic, and political factors^{16,17,29}.

Offering baby bottles and pacifiers, experiencing the first childbirth, and having non-protruded nipples are conditions associated with early weaning^{17,18,30,31}, reported in the literature and found in the present paper, in the report of 34.5% of interviewed mothers. Of the 17 children diagnosed with ankyloglossia, three used pacifiers and one used baby bottles in the first month of life. This contradicts the recommendation of the World Health Organization (WHO), which advises against using baby bottles before breastfeeding has been established³⁰.

Nonetheless, mothers with previous breastfeeding and 6-month EBF experiences managed to breastfeed for longer. This suggests that successful previous breastfeeding experiences are important. These findings agree with available papers^{14,16,29}.

Factors such as the mother's advanced age, mother's low income, smoking and alcohol use during pregnancy and breastfeeding, and low educational attainment are pointed out in the literature as negative interferences in the time of EBF^{14,18,29,31}. However, they did not impact breastfeeding in the present research, as most interviewed mothers were younger than 25 years, and the socioeconomic level of the participants was not studied.

Some limitations of this study can be mentioned. Even though the study design was longitudinal, the follow-up time was short (6 months); the lack of standardized diagnosis procedures and breastfeeding assessments weakens the discussion, especially in the comparative analysis between the various studies consulted; also, there was an apparent lack of interest

on the cause, represented by the complete absence of the studied population in retest scheduling. Besides this lack of interest, their difficulty reaching the health services should be considered. This, likewise, happens with the infant hearing screening test³², which has low retest adherence.

Technical difficulties occurred in the second collection moment. The main one, doubtlessly, was the COVID-19 pandemic declared by WHO in March 2020; this problem prevented in-person interviews with the mothers, as they had been previously planned. The only alternative was to interview them via mobile phone calls; it was then found that many of them had changed their numbers. Therefore, they were sent letters via conventional mail to the addresses they had informed in an effort to reach them – which was sometimes successful, but not always.

Pregnant women must be encouraged and instructed to give importance to tests that assess the presence of possible changes in their babies' lingual frenulum, as well as the benefits of at least 6-month EBF. Likewise, multidisciplinary teams should be cohesive in group decision-making regarding both diagnosis and the need for and opportunity of surgeries to facilitate EBF.

Some limitations of the study must be considered, given that breastfeeding was not assessed by the professionals; instead, it was investigated based on the mothers' answers via phone calls. Assessing the babies while they were lying down may have also hindered the proper visualization of the anatomical characteristics of the lingual frenulum; it is recommended that it be done with the baby in an inclined position. Moreover, the few babies diagnosed with ankyloglossia may not have been enough to associate breastfeeding difficulties with ankyloglossia.

Anyhow, the present research reinforces community guidelines regarding both public policies and private healthcare on the need for early identification of ankyloglossia and its potential interference in breastfeeding. It also points to other important associated factors, such as the type of nipple and pacifier and baby bottle use in the first month of life, which together can negatively interfere with the time of breastfeeding.

CONCLUSION

The prevalence of ankyloglossia in the studied population was 4.3% and it was not a hindering factor for breastfeeding. The hindering factors for EBF were baby bottle use in the first month of life and

breastfeeding difficulties. Non-protruded nipples were associated with breastfeeding difficulties.

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