

Breastfeeding duration and signs of mouth breathing in children with poor school performance

Tempo de amamentação e sinais de respiração oral em crianças com mau desempenho escolar

Tiempo de lactancia materna y signos de respiración bucal en niños con rendimiento escolar malo

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Abstract

Introduction: Breastfeeding is a protective factor for respiratory diseases, as well as contributing to the intellectual development of children. **Objective:** To analyze the relationship of breastfeeding time with signs of oral breathing in children with poor school performance. **Methods:** A cross-sectional study was carried out with 82 children aged 7 to 12 years old with poor school performance, recruited from public schools in a city in the interior of Minas Gerais. The parents answered a questionnaire containing the following topics: breastfeeding time in months, gender of the child, maternal schooling and signs of oral breathing. For the statistical analysis, Pearson's Chi-square test and Fisher's exact test were used, considering a significance level of 5%. **Results:** Of the total number of children studied, 61 (74%) received breastfeeding for more than six months, 60 (73%) were male, 47 (56%) of the mothers were illiterate or had incomplete elementary education. Signs of oral breathing were present in 57 (70%) of schoolchildren. There was an association between the time of breastfeeding and the report of complaints of nasal obstruction sporadically, difficulty or delay when swallowing food and sleeping with open mouth.

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Authors' contributions:

BAR was responsible for the development of research, collecting and analyzing the data and writing the manuscript; PFC participated in the elaboration of the research, literature survey and writing of the manuscript; SMAL performed a critical review of the manuscript; AMM was responsible for data analysis and critical review of the manuscript.

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Conclusion: Children who were breastfed for less than six months had a greater combined number of signs of oral breathing. There was a statistically significant association between the signs of oral breathing and the time of breastfeeding. Screening of children who need to be referred for multiprofessional evaluation of the respiratory mode can be performed through information on breastfeeding time and combined mouth breathing signals

Keywords: Breast Feeding; Mouth Breathing; Underachievement; Speech, Language and Hearing Sciences

Resumo

Introdução: A amamentação é fator de proteção para doenças respiratórias, além de contribuir para o desenvolvimento intelectual das crianças. **Objetivo:** Analisar a relação do tempo de amamentação com sinais de respiração oral em crianças com mau desempenho escolar. **Métodos:** Estudo transversal, realizado com 82 crianças de 7 a 12 anos de idade, com mau desempenho escolar, recrutadas nas escolas públicas de uma cidade do interior de Minas Gerais. Os pais responderam a um questionário contendo os seguintes temas: tempo de amamentação em meses, sexo da criança, escolaridade materna e sinais de respiração oral. Para a análise estatística foi empregado o teste Qui-quadrado de Pearson e Teste Exato de Fisher, considerando o nível de significância de 5%. **Resultados:** Do total das crianças estudadas, 61 (74%) receberam amamentação por mais de seis meses, 60 (73%) eram do sexo masculino, 47 (56%) das mães eram analfabetas ou tinham o ensino fundamental incompleto. Os sinais de respiração oral estavam presentes em 57 (70%) dos escolares. Houve associação entre o tempo de amamentação e o relato de queixas de obstrução nasal esporadicamente, dificuldade ou demora ao engolir o alimento e dormir de boca aberta. **Conclusão:** As crianças que foram amamentadas por tempo inferior a seis meses apresentaram maior número combinado de sinais de respiração oral. Houve associação estatisticamente significativa entre os sinais de respiração oral e o tempo de amamentação. O rastreamento de crianças que precisam ser encaminhadas para avaliação multiprofissional do modo respiratório pode ser realizado por meio das informações sobre tempo de amamentação e sinais de respiração oral combinados.

Palavras-chave: Aleitamento materno; Respiração bucal; Baixo rendimento escolar; Fonoaudiologia.

Resumen

Introducción: La lactancia materna es un factor de protección para las enfermedades respiratorias, además de contribuir al desarrollo intelectual de los niños. **Objetivo:** Analizar la relación del tiempo de lactancia con signos de respiración oral en niños con mal desempeño escolar. **Métodos:** Estudio transversal, realizado con 82 niños de 7 a 12 años de edad, con mal desempeño escolar, reclutados en las escuelas públicas de una ciudad del interior de Minas Gerais. Los padres respondieron a un cuestionario que contenía los siguientes temas: tiempo de lactancia en meses, sexo del niño, escolaridad materna y signos de respiración oral. Para el análisis estadístico se empleó la prueba Chi-cuadrado de Pearson y la prueba exacta de Fisher, considerando el nivel de significancia del 5%. **Resultados:** Del total de los niños estudiados, 61 (74%) recibieron amamentación superior a seis meses, 60 (73%) eran del sexo masculino, 47 (56%) de las madres eran analfabetas o tenían la enseñanza fundamental incompleta. Los signos de respiración oral estaban presentes en 57 (70%) de los escolares. Se observó asociación entre el tiempo de lactancia y el relato de quejas de obstrucción nasal esporádicamente, dificultad o demora al tragar el alimento y dormir de boca abierta. **Conclusión:** Los niños que fueron amamantados por tiempo inferior a seis meses presentaron mayor número combinado de signos de respiración oral. Se observó asociación estadísticamente significativa entre los signos de respiración oral y el tiempo de lactancia. El seguimiento de niños que necesitan ser encaminhados para evaluación multiprofesional del modo respiratorio puede ser realizado por medio de las informaciones sobre tiempo de lactancia y señales de respiración oral combinadas.

Palabras claves: Lactancia Materna; Respiración por la Boca; Rendimento Escolar Bajo; Fonoaudiología

Introduction

In the last three decades, the prevalence of breastfeeding in Brazil presented an upward trend whose main gains were observed between 1986 and 2006, followed by relative stabilization in 2013. In the low and middle income countries, only 37% of children under six months are exclusively breastfed. Ideal levels of breastfeeding could prevent more than 823,000 deaths of children under five years old per year, worldwide².

Breastfeeding has short-and-long-term benefits because it provides essential and irreplaceable nutrition for the child's growth and development. The new systematic review of the literature shows breastfeeding as a protective factor for infectious and chronic diseases, such as obesity and diabetes, as well as its positive impact on cognitive development².

Cognitive performance is a complex process that receives interference from genetic and environmental factors, which are related to each other, and breastfeeding is one of these factors. The baby needs stimulation in the period of neural plasticity, and the properties of breast milk can contribute to the intellectual development of the child in this period³. A Brazilian study pointed out that breastfed children had 30% or more chances to be classified as having above-average intellectual capacity when compared to children who were breastfed for less than six months⁴.

Breast milk strengthens the immune system of the child and it can promote the reduction of the risk of respiratory infections, an important etiological factor of the oral breathing^{2,3}. Studies point out the relationship between the right development of the orofacial organs and the physiology of the natural breastfeeding, which influences the oral function of mastication, swallowing, articulation of the speech sounds and breathing^{5,6}.

The acute and chronic respiratory diseases are common in children. The acute symptoms most reported by the parents of Brazilian children are the flu episodes, common colds and pharyngitis⁷. Rhinitis is the most prevalent chronic respiratory disease among schoolchildren (27.5%)⁸. In these cases, the signs of oral breathing, such as complaint of stuffy nose, sialorrhea and snoring are prevalent⁹.

Children who breathe through the mouth may develop speech disorders, malocclusion, difficulties in socialization and impairment in school perfor-

mance¹⁰. The results demonstrated by a systematic review of the literature evidenced that school children aged from seven to eleven with oral breathing have a greater tendency for learning difficulties than the nasal breathers¹¹.

Therefore, the objective of this study was to analyze the association of breastfeeding time with signs of oral breathing in children with poor school performance.

Method

This is a cross-sectional study, carried out with parents of 7-to-12-year-old children with poor school performance who were recruited in public schools in a city of the interior of Minas Gerais and that participated in the Specialized Educational Assistance (Atendimento Educacional Especializado, AEE)¹². In order to receive this service, the student should necessarily have low school performance in the formal school assessments reported by the teachers. The children were chosen by simple random selection.

It was performed a sample calculation that considered 9% of sample error, 95% of confidence interval and 50% of prevalence, giving attention to the outcome of interest. Considering the presented criteria, a sample of 90 participants was estimated. The inclusion criteria were: to be in the age range proposed by the research; and to be regularly enrolled and attend the municipal public school as well as the AEE. Children who were not breastfed (receiving directly from the breast or from the milking process) at any time were excluded.

Those responsible for the children with poor school performance were asked to answer questions about the sociodemographic and health aspects of the children. The data collection took place in the form of an interview in scheduled place, day and time. All participants signed the informed consent form.

The answer variable was "Breastfeeding Time", and the responsible person for the researched was asked how long the child had received breastfeeding. The definition of breastfeeding adopted in this study follows the WHO recommendation¹³, that is, when the child receives breast milk (directly from the breast or from the milking process), regardless of receiving other food or not. For the analysis, the variable was dichotomized between breastfeeding time up to six months and

more than six months. The six-month period was chosen because the WHO defines it as the period that the mother should offer exclusive breastfeeding¹⁴. In addition, there is a relationship between the harmonious growth of the stomatognathic system and the natural breastfeeding⁵.

The explanatory variables were: gender of the child, maternal schooling, major and minor signs of oral breathing according to the proposal published in a scientific journal⁹. In this instrument there is the investigation about the presence of signs of oral breathing, the child being classified according to the absence or presence of oral breathing. For the child to be classified as an oral breather, he/she should have two major signs (to snore, sleep with open mouth, drool on the pillow, complain of daily nasal obstruction), or a major sign associated with two or more minor signs (nose itching, complaint of sporadic nasal obstruction, difficulty in breathing at night or restless sleep, daytime somnolence, irritability during the day, difficulty or delay in swallowing food, more than three episodes of throat infection, ear infection or sinusitis – proven by a physician in the last 12 months, difficulty in school learning or grade repetition). The item “difficulty in school learning or grade repetition” was considered positive only for those children who repeated the school year, since all the children in this study presented learning difficulties.

The data collected were scanned and analyzed using the Excel and STATA 12.0 programs. It was made the descriptive analysis of the variables of interest. The association of these variables with the time of breastfeeding was accomplished using

Pearson’s Chi-square test and Fisher’s Exact test. The considered level of significance was 5%.

This study was approved by the Ethics and Research Committee under decision 403.08/UFGM.

Results

We interviewed 82 persons responsible for the children with poor school performance, with a loss of 8.8% regarding the refusal to participate or incomplete questionnaire. Of the total children studied, 61 (74%) received breastfeeding for more than six months, 60 (73%) were male; 47 (56%) of the mothers were illiterate or had incomplete primary education; and 57 (70%) presented oral breathing characteristics (Table 1).

Of the 21 children that were breastfed for less than six months, 19 (90.5%) had oral breathing characteristics. In this study there was no association with statistical significance between the breastfeeding time and the variables “gender” and “mother’s schooling” (Table 1).

The frequency of oral breathing was higher in the group of children who were breastfed for less than six months, except for the signs of somnolence and repetition. Regarding the minor signs of oral breathing, there was a statistically significant association between the variables “complaint of sporadic nasal obstruction” and “difficulty or delay in swallowing food” (Table 2). Regarding the major signs of oral breathing, the study showed that there was statistical significance between “to sleep with open mouth” and “breastfeeding time” (Table 3).

Table 1. Relationship between the breastfeeding time with the variables: oral breathing, gender and mother's schooling

Variables	Breastfeeding time				Value of p
	More than six months		Up to six months		
	N	%	N	%	
Oral Breather					
Yes	38	57.3	19	90.5	0.016*
No	23	42.7	2	9.5	
Gender					
Male	43	68.3	17	80.9	0.265
Female	20	31.7	4	19.1	
Mother's schooling					
Illiterate or with incomplete elementary school	38	61.3	9	42.9	0.141
Complete elementary school or incomplete secondary school	24	38.7	12	57.1	

* Pearson's Chi-square test or Fisher's Exact Test with $p \leq 0.05$. It is observed the absence of response for some presented variables

Table 2. Relationship between the breastfeeding time with the variables of minor signs of oral breathing

Variables	Breastfeeding time				Value of p
	More than six months		Up to six months		
	N	%	N	%	
Dificuldade respiratória noturna ou sono agitado					
Sim	18	29.6	11	52.4	0.059
Não	43	70.4	10	47.6	
Coceira no nariz					
Sim	22	36.1	10	47.6	0.349
Não	39	63.9	11	52.4	
Complaint of sporadic nasal obstruction					
Yes	34	56.7	19	90.5	0.005*
No	26	43.3	2	9.5	
Daytime somnolence					
Yes	20	32.8	4	19.1	0.278
No	41	67.2	17	80.9	
Irritability during the day					
Yes	43	70.5	18	85.7	0.248
No	18	29.5	3	14.3	
Difficulty or delay in swallowing food					
Yes	8	13.1	8	38.1	0.013*
No	53	86.9	13	61.9	
More than three episodes of throat infection, ear infection or sinusitis					
Yes	35	57.4	13	61.9	0.716
No	26	42.6	8	38.1	
Grade repetition					
Yes	14	77.8	15	71.4	0.554
No	49	22.2	6	28.6	

* Pearson's Chi-square test or Fisher's Exact Test with $p \leq 0.05$. It is observed the absence of response for some presented variables

Table 3. Relationship between the breastfeeding time with the variables of major signs of oral breathing

Variables	Breastfeeding time				Value of p
	More than six months		Up to six months		
	N	%	N	%	
To snore					
Yes	27	44.3	12	57.1	0.308
No	34	55.7	9	42.9	
To sleep with open mouth					
Yes	30	49.1	17	80.9	0.012*
No	31	50.9	4	19.1	
To drool on the pillow					
Yes	27	44.3	14	66.6	0.077
No	34	55.7	7	33.4	
To complain of daily nasal obstruction					
Yes	17	27.9	6	28.6	0.951
No	44	72.1	15	71.4	

*Pearson's Chi-square test or Fisher's Exact Test with $p \leq 0.05$. It is observed the absence of response for some presented variables

Discussion

Although most of the children in this study were breastfed for more than six months, the practice of breastfeeding in Brazil is assessed as poor or very poor as to the prevalence and duration of exclusive breastfeeding in children under six months¹⁵. The prevalence in Brazil of breastfeeding in children under six months old showed a stabilization between 2006 (37.1%) and 2013 (36.6%), which causes concern since, for the first time in the historical series, no real gains were observed when compared to the previous decades¹.

The present study highlights the result which pointed out that 90.5% of children who were breastfed for less than six months were classified as mouth breathers. A study with 370 schoolchildren from Abaeté/Minas Gerais, from three to nine years old, found a prevalence of 55% of oral breathing children using the same questionnaire with the responsible people and medical evaluation. It should be pointed out that of the 189 children who had a questionnaire and clinical examination compatible with an oral respirator, 9 presented only clinical evaluation compatible with the symptoms and 6 presented suggestive medical history of oral breather, but without change in clinical examination¹⁶. Thus, the questionnaire showed to be a positive aid in the detection of children with altered airway. Using the same evaluation criteria for children from 30 to 48 months, it was found a prevalence of 37.2% of oral breathing children and

that had been breastfed up to six months¹⁷. These findings reinforce the finding in this study that the probability of developing an inadequate breathing pattern is related to the duration of breastfeeding.

Oral breathing syndrome is common in children of school age, being one of the responsible factors for the low school performance. A study showed that children with oral breathing obtained lower performance than the nasal breathers in the reading comprehension, arithmetic and operational memory for pseudo words skills¹⁸.

In this study, having "difficulty or delay in swallowing food" and "complaint of sporadic nasal obstruction" was associated with breastfeeding time. This result differs from another one found in a study with 52 children of both genders, from five to eight years old, in which the time and type of breastfeeding were not statistically associated with mastication, swallowing and breathing functions¹⁹. Lopes et al.¹⁷ did not find associations with statistical significance between duration of exclusive or total breastfeeding with breathing patterns in children with an average age of three years. One hypothesis for this difference of the results found in the previous studies would be the age and distinct characteristics of the investigated populations. Besides that, it can be inferred that the divergence of the result "complaint of sporadic nasal obstruction" with "complaint of daily nasal obstruction", in this study, may be caused by the chronicity of the problem, with less possibility of being perceived by the parents.



Another sign that was associated with the duration of the breastfeeding was the report of sleeping with open mouth. Among the breathing difficulties commonly found in oral breathers are the obstructive sleep apnea syndrome and the snoring²⁰. In a literature review, it was found that the obstructive sleep apnea concomitantly with the snoring causes neurocognitive disorders, somnolence, inattention, impaired comprehension and consequently learning difficulties²¹. Oral breathing children presented more eating problems, difficulties with the sleep, nighttime snoring and open-mouth sleep when compared to nasal breathers²².

It was not found association between maternal schooling and breastfeeding time. Some sociodemographic variables are described as possible responsible for early weaning, such as low income and schooling²³. A study in Brazil showed that the higher the level of maternal schooling, the shorter the time of breastfeeding²⁴. Another study showed that the higher the maternal schooling, the greater the probability of the child being exclusively breastfed until four months old and that the maternal work is a factor which is related to the weaning²⁵. Comparing these results with the findings of this study it can be inferred that the absence of statistical significance may be related to the sample size and the difference in the classification of the type of breastfeeding regarding the exclusivity and duration. The association between breastfeeding time and the gender of the child is poorly described in the literature and in this study no associations were found, as well as in the research conducted in Nigeria²⁶. Regarding the variables related to the child, the pacifier appears as the aggravating factor for the interruption of the breastfeeding²³.

There are several aspects that influence in the extension of breastfeeding time that were not investigated in the present study. A recent study accomplished with 1,344 mother-child dyads, selected from Brazilian maternity hospitals, followed up for six months, found, as factors that interfere in the time of breastfeeding: appreciation of the mother's partner for breastfeeding, prenatal care offered by public services, knowledge about breastfeeding received at the hospital²⁷. Besides that, younger mothers that work are less likely to feed their babies exclusively²⁶.

The relationship between breastfeeding time and breathing seems to be independent of the presence of poor school performance. However,

by a methodological option, the present study investigated only the children with poor school performance, not allowing extrapolating the interpretation of the results.

In order to know the causal relationship between the breastfeeding time and oral breathing, considering all the factors related to both events, studies with longitudinal design are needed, following children from the birth to six months old or at the end of the breastfeeding. And it would be convenient a comparison between groups of children with and without low school performance. However, this study was motivated by a social demand from the municipal teaching service, which attended children with poor school performance, of the city where the research was carried out. Another recommendation would be the inclusion of assessments for the classification of oral breathing children, since despite the reports of the parents being able to identify them, there are losses in the specificity of the test.

On the other hand, the results that were found reinforce the recommendation that the investigation of the presence of signs of oral breathing and of breastfeeding time be used to refer the children early to confirm the clinical diagnosis of the breathing pattern and the possible intervention.

Final considerations

Children with poor school performance and less than six months of breastfeeding had a greater combined number of oral breathing signs. There was an association between the breastfeeding time and the report of complaints of sporadic nasal obstruction, difficulty or delay when swallowing food and sleeping with open mouth. The screening of children who need to be referred for multiprofessional evaluation of the respiratory mode can be performed through the information about the breastfeeding time and combined mouth breathing signals.

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