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Duration of exclusive breastfeeding and wheezing in the first year of life: A longitudinal study

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Abstract

Introduction: Wheezing is the most common symptom associated with asthma in young children. There is a lack of well-designed prospective studies on the relationship of exclusive breastfeeding with wheezing in infants. This prospective cohort study investigated whether a relationship exists of exclusive breastfeeding with wheezing at 12 months of age.

Materials and methods: A series of 1632 mother–infant pairs were sequentially recruited. Mothers were trained at hospital on breastfeeding practices and how to recognise wheezing. At hospital discharge they received a calendar-diary to record the date at stopping breastfeeding and at onset of wheezing. Data were collected by telephone interviews through 12 months post-delivery. Breastfeeding was in accordance with the World Health Organisation and wheezing with the International Classification of Diseases (ICD-10-CM code R06.2).

Results: At 12 months 1522 mother–infant pairs were participating. Breastfeeding started in 95.9% of them and was exclusive in 86.1%. The incidence of wheezing ever and recurrent wheezing at 12 months of age was 33.7% and 10.0%, respectively. Duration of exclusive breastfeeding was shorter in wheezing than non-wheezing infants (median 2.6 months vs. 4.1 months, $P < 0.001$). After adjustment for confounders each month of exclusive breastfeeding reduced the risk of wheezing ever by 11% and of recurrent wheezing by 15%, at 12 months of age.

Conclusion: Longer duration of exclusive breastfeeding reduces the risk of wheezing throughout the first 12 months of life. These findings would be relevant to all healthcare operators and mothers, also to improve their awareness about the best feeding practices for the infant's health.

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Introduction

Exclusive breastfeeding is the preferred feeding method during the first six months of life^{1,2} and provides all the energy and nutrients infants need in this period.³ Breastfeeding offers health advantages for infants and mothers² and may benefit the respiratory tract of the young child,^{2,4-6} possibly also reducing the risk of asthma.^{5,6}

Wheezing is the most common symptom associated with asthma in children aged five years or younger⁷ with high prevalence worldwide, ranging from approximately 25% to 50% in the first year of life.^{8,9} It has been reported that early wheezing could increase the risk of respiratory morbidity in infancy¹⁰ and young adulthood,¹¹ implying a cost burden.^{2,8,9,12} Identifying factors associated with wheezing in early life can therefore be of clinical and social relevance.

After the Tucson research started in the late 1980s,¹³ studies have evaluated the relationship of breastfeeding with wheezing in early age (e.g.,^{4,5,14-16}) and systematic reviews support that breastfeeding is protective against asthma and wheezing in young children.^{6,17-19} Silver et al.⁴ found that the duration of exclusive breastfeeding was a stronger determinant of respiratory outcomes, including wheezing, than "any" breastfeeding at 15 months of age. Indeed, the relationship between exclusive breastfeeding and wheezing and/or other asthma-related outcomes has been scantily studied so far,^{4,20-25} possibly due to the complexity to conduct cohort studies collecting accurate data on infant feeding, prospectively. There is a need for studies based on large cohorts, strict eligibility criteria and definitions, longitudinal and accurate data, including continuous measurement of breastfeeding, while taking into account a minimum set of confounders.^{2,4-6,12-19}

This study was conducted on the basis of these recommendations with the aim of assessing if a relationship exists of exclusive breastfeeding with wheezing during the first year of life in at term healthy newborns.

Materials and methods

In this prospective cohort study, 1632 mother–infant pairs were sequentially recruited at the San Paolo Hospital in Milan, Italy, between September 1st, 2013, and August 31st, 2014, according to the following eligibility criteria. Inclusion criteria were: gestational age within 37–42 completed weeks, weight at birth equal or above 2500 g and lower than 4000 g, single birth, absence of congenital anomalies, mother speaking Italian, family living within a 15 km distance to hospital. Exclusion criteria were: infant dead at the maternity ward, infant moved to another hospital/clinic, infant with galactosemia or other inherited metabolic disorders or disease requiring hospitalisation longer than seven days, maternal conditions under which breastfeeding may not be in the best interest of the infant.² Mothers and infants were checked for eligibility at the maternity ward, and willing women signed a consent to participate in the study. All procedures were in accordance with the ethical standards of the responsible ethics committee which approved the study.

Data collection

Experienced neonatologists saw the infants and took anthropometric measurements within 12 h of birth using an electronic scale (Seca Digital Baby Scale Model 376, Seca GmbH & Co. KG, Hamburg, Germany) for weight and the Harpenden infantometer (Chasmors Ltd, London, UK) for recumbent length, following standardised procedures. Socio-demographic characteristics and medical history were collected during the hospital stay. Pre-pregnancy body mass index (BMI) was calculated from self-reported body weight before pregnancy and height measured at the hospital using a Seca integrated measuring rod (model 704s, Seca GmbH & Co. KG). A woman was defined underweight, normal weight, overweight or obese in accordance with the World Health Organisation (WHO).²⁶ Wheezing was defined in accordance with the International Classification of Diseases (ICD-9-CM code 786.07 now translated to ICD-10-CM code R06.2) as a high-pitched, whistling sound during breathing, resulting from the narrowing or obstruction of the respiratory airways.²⁷ The breastfeeding practices were in accordance with the WHO as updated in 2007.²⁸ "Any" breastfeeding was defined as the feeding practice requiring that the infant receives breast milk (including milk expressed or from a wet nurse) and allows the infant to receive anything else. "Initiation" of (exclusive) breastfeeding was defined as (exclusive) breastfeeding started within 48 h post-delivery. In absence of an international standard, this definition appears a reasonable choice.

A paediatrician instructed mothers how to record in a calendar-diary the date of stopping breastfeeding and the date when liquids (water or water-based drinks, fruit juice, non-human milk or formula) or solid, semi-solid or soft foods were introduced, and the day at onset of any wheezing episode. An allergist trained mothers how to recognise wheezing. He/she explained the meaning of wheezing and the difference from other respiratory outcomes, particularly cold and noisy breathing. Thereafter, he/she showed sequentially the video of an infant with clinical diagnosis of wheezing and the videos of two non-wheezing infants having noisy breathing caused by mucus rattling or nasal congestion, respectively. The training process was previously validated in the hospital on 40 mothers. Accuracy in recognising wheezing was estimated at 91.9%, with sensitivity = 91.2%, specificity = 92.5%, positive predictive value = 92.4, predictive negative value = 91.4%. On day of hospital discharge a paediatrician consigned to mothers a brochure outlining the benefits of breastfeeding and invited them to contact the hospital if needed, and whenever the infant wheezed during lactation, to support mothers to continuing breastfeeding.

Calibrated personnel collected data by telephone on infant feeding practices and wheezing, at 30, 60, 90, 180, 270 and 360 days of age (± 3 days).

For the analysis, the number of wheezing episodes was categorised as "no wheezing" (no wheezing episode) and "wheezing ever" (one or more episodes of wheezing). Wheezing ever was additionally split as "occasional wheezing" (one or two episodes) or "recurrent wheezing" (three or more episodes).⁸ The duration of breastfeeding was considered as both a continuous (days) and a categorical

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