

Infant weight trajectories and early childhood wheezing: the NINFEA birth cohort study

Popovic M¹, Pizzi C¹, Rusconi F², Galassi C³,
Merletti F^{1,3}, Richiardi L^{1,3}

¹ University of Turin, Department of Medical Sciences, Turin, Italy

² Unit of Epidemiology, 'Anna Meyer' Children's University Hospital, Florence, Italy

³ AOU Città della Salute e della Scienza and CPO Piemonte, Turin, Italy

Background

Accumulating evidence suggests that both overweight and rapid weight gain during infancy increase the risk of wheezing and asthma in children.

Proposed mechanisms include systemic inflammation, mechanical changes associated with high body weight and dissociation between somatic and pulmonary growth in infants who grow fast.

It remains unclear whether early rapid weight gain and infant body size act independently on the development of wheezing or are just two correlated indicators.

Methods

The NINFEA is an ongoing internet-based birth cohort established in 2005 in Italy. Weight measurements from birth up to 18 months of age, wheezing ascertained at the age of 18 months (≥ 1 episode in the past 12 months) and data on potential confounding factors were obtained from the NINFEA questionnaires completed by mothers during pregnancy and 6 and 18 months after delivery.

The study included **4142** singletons born at term, with at least one weight measurement from birth up to 18 months of age and a complete information on the occurrence of wheezing.

The SuperImposition by Translation And Rotation (SITAR) model was used to estimate individual weight trajectories defined by three biologically interpretable child-specific parameters: *size* (average weight), *weight velocity* and *tempo* (age at peak weight velocity). These estimated parameters were then related to wheezing using logistic regression.

Objective

To assess whether infant size and velocity of weight gain act independently on the development of wheezing in early childhood by using a novel approach in growth modeling that allows for mutual adjustment of different aspects of growth.

Results

A median of 5 weight measurements per child was obtained. Wheezing prevalence in the last 12 months was 20.1%.

Table 1. Estimated odds ratios (OR) and 95% confidence intervals (CI) for the association between growth parameters and wheezing in infants

Growth parameters [§]	Wheezing			
	OR _{crude}	95% CI	OR _{adjusted} [*]	95% CI
<i>Size</i>	1.30	1.14–1.49	1.36	1.17 - 1.59
<i>Tempo</i>	1.00	0.89-1.14	1.01	0.87 – 1.18
<i>Velocity</i>	1.29	1.15-1.46	1.27	1.14 – 1.49

[§] Growth parameters are standardized (the effects are expressed as an increase in one SD) and adjusted for sex, with three internal knots for the spline curve

^{*}Adjusted for child's sex, gestational age, lower respiratory tract infections (bronchitis, bronchiolitis and pneumonia), maternal history of asthma, parity, maternal pre-pregnancy BMI, maternal smoking during pregnancy and maternal age and education at delivery

Conclusions

Larger size and faster weight gain over the first 18 months of life are independently associated with an increased risk of early childhood wheezing.

Figure 1. Population predicted weight and velocity growth curves modelled using the SITAR method

