Antibiotic Exposure by 6 Months and Asthma and Allergy at 6 Years: Findings in a Cohort of 1,401 US Children

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This analyses of a cohort included 1,401 US children, assessed the association between antibiotic use within the first 6 months of life and asthma and allergy at 6 years of age.

KEY POINTS FROM THIS STUDY

1) 25% of urban children in the developed world have asthma.

2) “Many studies have reported that antibiotic use may be associated with increased risk of childhood asthma.”

3) “Many studies report a positive association between antibiotic use and childhood asthma, including a large prospective cohort study with more than 5,000 cases of childhood asthma that determined early antibiotic exposure to be one of the most important predictors of childhood asthma.”

4) “The 'hygiene hypothesis' is a frequently cited explanation for the increasing prevalence of allergic diseases,” suggesting that “reduced exposure to bacteria and viruses may delay development of the immune system and promote atopic immune responses.” [including the use of antibiotics and vaccines]

5) Gastrointestinal flora are important for developing a healthy immune system with resistance to allergic sensitization, and antibiotic exposure in early life might increase the risk of atopic diseases through altered microbial exposure.

RESULTS FROM THIS STUDY:

1) “One third of the children had been exposed to antibiotics by 6 months of age.”

2) “Nearly 70% of children with a history of lower respiratory infections and more than 50% with otitis in the first year of life had received antibiotics.”

3) “Children of African-American or Hispanic mothers had twice the risk of asthma compared with children of white mothers.”

4) If one parent had a history of asthma, the increased risk of asthma was 140% compared with children with no history of parental asthma. If both parents had a history of asthma, the increased risk was 257%.
5) “The number of antibiotic courses before 6 months of age and asthma show a dose-response relation.”

6) One course of antibiotic exposure increased the risk of asthma by 40%.

7) Two or more courses of antibiotic exposure increased the risk of asthma by 72%.

8) The increased risk for asthma in children who had no parental history of asthma was 89%.

DISCUSSION

1) “The association of antibiotics and asthma in the present study was particularly strong in children with no family history of asthma.”

2) The hygiene hypothesis suggests that “microbial exposure [becoming infected] in early life enhances postnatal maturation of the immune system that may protect against development of allergic diseases.”

3) “Normal postnatal development incurs a change from fetal predominantly T helper 2 (known as ‘TH2’) to more mature T helper 1 (known as ‘TH1’) immunity.” This is important because “Overexpression of TH2 responses to allergens is the hallmark of allergic diseases.”

4) “Microbial exposure, particularly in the intestinal tract, is necessary for postnatal transition to a balanced immune response in healthy children.”

5) “The early postnatal period is particularly vulnerable to imbalances in immune response, and that delayed postnatal maturation of TH1 cell function is a key component of genetic risk for atopy.”

6) Children with no family history of asthma are more susceptible to the effects of antibiotics than children with a genetic predisposition to asthma.

7) “We found a strong association between early antibiotic exposure with reported positive immunoglobulin E blood or skin test reactivity.”

8) “We conclude that antibiotic exposure before 6 months of age is associated with asthma and allergy at 6 years of age.”

9) “The adverse effect of antibiotics on asthma risk was particularly strong in children with no parental history of asthma, which should encourage physicians to avoid unnecessary antibiotic use in low-risk children with no genetic predisposition to asthma.”

10) Antibiotic exposure is associated with increased risk of asthma by 52%.