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Prenatal exposure to maternal asthma and asthma medication and neurodevelopmental outcomes: a population cohort study of 179,024 children

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Objectives

To investigate the associations between treated and untreated asthma during pregnancy and neurodevelopmental outcomes in the offspring, including autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD) and learning difficulties, and to determine whether these associations are specific to one or more class of asthma medication.

Methods

A population-based retrospective birth cohort was constructed using linked health and education records of children liveborn in Wales between 2009 and 2016, with up to 13 years follow-up, to mothers registered with a Secure Anonymised Information Linkage (SAIL)-contributing general practice for at least two years before delivery. Generalized estimating equations with a binomial distribution and logit link function were employed to evaluate associations between treated and untreated maternal asthma and special education needs (SEN) in the offspring. Survival analyses were used to investigate associations with ADHD.

Results

Among 179,024 children (49.4% female, mean age 5.68 years (SD 1.11)), 11,991 (6.7%) had mothers with treated asthma, 4,927 (2.8%) mothers with untreated asthma, and 5,265 (2.9%) mothers who took asthma medication without a recorded asthma diagnosis. SEN was recorded in 50,955 (28.5%) children. Prenatal exposure to short-acting beta agonists (SABA) was associated with increased risk of SEN (aOR 1.23, 95% CI 1.18-1.28) and ADHD (aHR 1.39, 95% CI 1.23-1.56), with similar risks for inhaled corticosteroids (ICS). Untreated maternal asthma was also associated with SEN (aOR 1.14, 95% CI 1.07-1.23) and ADHD (aHR 1.70, 95% CI 1.42-2.05), suggesting that asthma itself contributes to risk. In contrast, ASD was associated with SABA with or without other asthma medication (aOR 1.20, 95% CI 1.05-1.37) and not with untreated maternal asthma.

Conclusions

Prenatal exposure to SABA was associated with a higher risk of ASD. Asthma treatment is required during pregnancy but treatment choices need to carefully balance potential maternal and offspring risks.

