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## **Severity of asthma in pregnancy affects perinatal outcomes**

### **Authors' Reply**

Sir,

We thank Dr Jana and colleagues for their comments on our recent publication <sup>1</sup>. We have conducted meta-analyses on additional perinatal outcomes, including perinatal mortality, and on asthmatics sub-divided by severity, exacerbation and oral steroid use. However, limitations on space in this publication prevented their inclusion here. We chose to include preterm birth, low birth weight and pre-eclampsia because they are the most widely reported poor outcomes among women with asthma, and important contributors to the short and long term health of the neonate.

We agree that mothers with more severe asthma or exacerbations during pregnancy will be at greater risk of poor outcomes. We previously published a smaller systematic review and meta-analysis demonstrating that women with exacerbations during pregnancy were 2.5 times more likely to have a low birth weight baby than women without asthma, while women without exacerbations were not at increased risk of low birth weight <sup>2</sup>. The current review perhaps simplifies the problem of asthma during pregnancy by comparing outcomes for all women with a doctor's diagnosis of asthma to those with no asthma. While the majority of women included in the primary studies would be expected to have mild asthma, the effect of asthma on perinatal outcomes was still significant, suggestive of a further effect among a sub-group with more severe disease.

Active asthma management may be another simplification, and one limitation we faced was the quality and detail of reporting in the primary studies, and their observational nature, which limits our investigation. In our experience, asthma education alone is not sufficient to improve perinatal outcomes, or the exacerbation rate among mothers. In our recent prospective cohort where an asthma educator provided assessments, self-management education and a written action plan, 45% of women with asthma had an exacerbation requiring medical intervention during pregnancy <sup>3</sup>. To date, the strategy we found to be effective in reducing exacerbations was titrating the inhaled steroid dose by the level of exhaled nitric oxide (FENO), rather than by symptoms and lung function <sup>4</sup>. In this randomised trial, the exacerbation rate among those managed by symptoms was unacceptably high (41%), while in the group managed by FENO, the exacerbation rate was reduced to 25%. Monthly asthma education, including optimisation of inhaler technique and instruction about medication use was provided to both groups, but only those managed by FENO had a further reduction in the exacerbation rate.

We agree that the literature supports the notion that adequate control of asthma and provision of an appropriate level of medication are essential to minimising the risk of perinatal complications among women with asthma. Low birth weight and preterm delivery are important pregnancy outcomes, caused by many different exposures. Although asthma is a risk factor, asthma can be treated and controlled, indicating it is a modifiable risk factor for these outcomes. We therefore need studies that capture information about asthma impairment, exacerbations, and medication use and are sufficiently powered

to determine the beneficial effects of optimal asthma care on perinatal outcomes.

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