Maternal haemoglobin levels during pregnancy and asthma in childhood

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Disclosure Statements

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Conflict of Interest Statement
The authors declare that they have no conflicts of interest
Background

Asthma prevalence has increased past few decades

Highest incidence occurring in children

Maternal factors associated with asthma in offspring
Background

Nutrients and oxygen supply to the fetus critical factor for health and development

Low and high haemoglobin levels during pregnancy → suboptimal fetal oxygen and nutrients supply → adverse birth outcomes

Several studies examined the association with adverse birth outcomes

One study examined the association with respiratory outcomes

Maternal anaemia associated with wheeze < age 3 years

Maternal anaemia associated with asthma among asthmatic mothers

(Triche et al, Ann Allergy Asthma Immunol, 2011)
Hypothesis

Low and high haemoglobin levels

Suboptimal supply of oxygen and nutrients to the fetus

Intrauterine growth restriction

Lung development
Objective

To examine whether maternal haemoglobin levels during pregnancy are associated with asthma and related outcomes in the offspring.
Methods

Design


- Obstetric records and hospital registries
- Questionnaires and measurements
  - First trimester
  - Second trimester
  - Third trimester
  - Delivery
  - Year 1
  - Year 2
  - Year 3
  - Year 4
  - Year 5
  - Year 6
  - Haemoglobin measurement
  - Information on potential confounders
  - Asthma and related outcomes

Jaddoe et al, Eur J Epidemiol, 2012
Methods

Haemoglobin concentrations

Low haemoglobin: <6.8 mmol/l
High haemoglobin: ≥ 8.2 mmol/l

Asthma and related outcomes

- Wheezing
- Physician diagnosed asthma ever
- Fractional Exhaled nitric oxide (FeNO)
- Airway resistance (Rint)

Data analysis

- Logistic and linear regression analyses
- Adjustment for potential confounders

Parent reported questionnaires
Visit research center
## Results

<table>
<thead>
<tr>
<th>Haemoglobin levels</th>
<th>(N=6229)</th>
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<tbody>
<tr>
<td>Normal</td>
<td>4509 (72%)</td>
</tr>
<tr>
<td>Low</td>
<td>810 (13%)</td>
</tr>
<tr>
<td>High</td>
<td>909 (15%)</td>
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<table>
<thead>
<tr>
<th>Asthma and related outcomes</th>
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<tbody>
<tr>
<td>Wheezing</td>
<td>845 (14%)</td>
</tr>
<tr>
<td>Asthma ever</td>
<td>619 (10%)</td>
</tr>
<tr>
<td>FeNO (Median (range))</td>
<td>7.39 (0.1-119.0)</td>
</tr>
<tr>
<td>Rint (Mean ± SD)</td>
<td>-0.11 (3.58)</td>
</tr>
</tbody>
</table>
Results

Adjusted for gestational age at blood sampling, maternal age, maternal ethnicity, maternal educational level, household income per month, maternal BMI before pregnancy, family history of atopy, gender child, smoking during pregnancy, folic acid intake, maternal complications during pregnancy, caesarean section, birth weight z-score, breastfeeding, multiparity, history of cow’s milk allergy first year, vitamin D supplementation, day-care attendance.

Additionally adjusted for FeNO technique.
Results

The diagram illustrates the relationship between maternal haemoglobin levels and Rint, with β (95% CI) indicating change in z-score. The levels are categorized as Normal, Low, and High.
Discussion

Strengths

Objective measurement of haemoglobin concentrations

Adjusted for gestational age at blood sampling

Limitations

Information wheezing and asthma diagnosis obtained by parent-reported questionnaires
Conclusion

Maternal haemoglobin levels during pregnancy are not associated with asthma or related outcomes in the offspring until the age of 6 years.
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