Association Between Prenatal Distress and Abnormal Infant Cytokine Differentiation on Childhood Atopic Dermatitis

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Background

- Atopic Dermatitis (AD), also known as "eczema," is a hypersensitive skin disease, characterized by inflamed and scaly skin lesions in response to normal levels of allergen exposure.
- Prenatal psychosocial distress (including stressful life events, allergen exposure, and maternal immunoologial factors) early in gestation can affect programming of infant immune responses and susceptibility to AD.
- Th2 and Th1 cells (including TNF-α and IFN-γ and various interleukins) in the blood
- The pathogenesis of AD is known to involve abnormal levels of specific cytokines released by Th2 and Th1 cells (including TNF-α, IFN-γ and various interleukins) in the blood (Parkin, 2001).
- Maternal psychosocial distress (including stressful life events, anxiety and depression) is a risk factor for the development of abnormal immunity in infants, characterized by altered levels of the above cytokines, predisposing the child to AD.
- Demographic factors such as low SES may also contribute to AD (Wright, 2008).
- Excessive, long-term glucocorticoid exposure during critical developmental periods increases Th2 specific cytokine levels and decreases Th1 specific cytokine levels, particularly through fetal programming, driven by prenatal distress (Wright, 2008).

Research Questions

1. Describe the association between maternal prenatal distress and AD at 18 months.
2. Build a best fit model from the identified associations in (1), (2) & (3).
3. Describe the association between mother-infant demographics and AD at 18 months.

Design & Methods

Secondary analysis of data from the Fetal Programming of Infant Stress Reactivity and Infant Atopic Disease sub-study to the longitudinal cohort study, APrON, was undertaken.
- Participants were enrolled in the APrON study (see www.apronstudy.ca for recruitment details). We obtained data from 120 mother-infant dyads. The mean age for mothers was 31 years (s.d. ± 4.02) and children, 2.99 months (s.d. ± 1.46). A large majority of mothers were married (90.07%). More than half of the mothers (51.76%) were first time mothers.
- AD was defined by maternal report of either (1) presence of rash on child in last 6 months (excluding diaper rash) & Anxiety

Table 1: Significant correlations between maternal prenatal distress and infant cytokines

<table>
<thead>
<tr>
<th>Biomarker</th>
<th>Prenatal Depression</th>
<th>Prenatal Anxiety</th>
<th>Postnatal Anxiety</th>
<th>Prenatal Stressful Event(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL10</td>
<td>0.154 (p = 0.09)</td>
<td>0.188 (p = 0.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL12p70</td>
<td>0.225 (p = 0.014)</td>
<td></td>
<td>0.199 (p = 0.00)</td>
<td></td>
</tr>
<tr>
<td>IL8</td>
<td>-0.277 (p = 0.010)</td>
<td>-0.28 (p = 0.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IL4</td>
<td></td>
<td>-0.24 (p = 0.04)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Final logistic regression model

<table>
<thead>
<tr>
<th>Atopic Dermatitis Predictors</th>
<th>OR (C.I)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL12p70</td>
<td>4.83( 1.27 -18.33)</td>
<td>0.02</td>
</tr>
<tr>
<td>IFN</td>
<td>0.39 (0.18 -0.84)</td>
<td>0.017</td>
</tr>
<tr>
<td>IL10</td>
<td>0.01 (0.00 - 0.60)</td>
<td>0.03</td>
</tr>
<tr>
<td>Prenatal Depression &amp; Anxiety</td>
<td>2.63(1.03 -6.67)</td>
<td>0.041</td>
</tr>
</tbody>
</table>

Conclusions

- Prenatal distress is associated with elevated infant cytokines.
- The final model showed that prenatal anxiety and depression, in combination with elevated infant cytokines at 3 months, predicted childhood AD.
- The results of this study may influence:
  1. Clinical implications for primary care physicians & nurses working directly with women and children.
  2. Support programs for mothers diagnosed with, or at risk, for depression, stress or anxiety.
- Assessing infant cytokines may be useful as a predictor of infant AD and therefore offer opportunity for prevention.
- Future research will evaluate how maternal-child interaction moderates associations between both (1) perinatal distress and (2) immune biomarkers, and atopic dermatitis (rash) in children at 18 months.

Results

1. Table 1 presents the significant associations between prenatal distress and infant cytokines.
2. Table 2 presents the final model and the goodness of fit statistics. None of the demographics contributed to the final model.

Acknowledgments

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