

Association of Early Childhood Allergic Diseases with
Neurodevelopmental Outcomes in Japanese Children

by

Abir Nagata

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Supervisor: Kazunari Onishi

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Abstract

Background: The relationship between childhood allergies and neurodevelopmental disorders has been widely studied. However, the specific impact of certain allergic diseases on early-life neurodevelopmental delays remains unclear. The objective of this study is to evaluate the potential association between early childhood allergic diseases and neurodevelopmental delays within the first three years of life.

Methods: This study utilized data from a large nationwide prospective birth cohort study in Japan, conducted by the Japan Environment and Children's Study Group in collaboration with 15 Regional Centers across the country. The final analysis included 87,986 children (boys, n=45,357 [51.6%]; girls, n=42,629 [48.4%]) out of the 100,303 children born to women enrolled between January 2011 and March 2014. The exposures of interest in this study were physician-diagnosed and caregiver-reported allergic conditions, namely atopic dermatitis (AD), asthma, and food allergy (FA). The assessment of neurodevelopmental milestones, encompassing communication, gross motor, fine motor, problem-solving, and personal-social skills, utilized the Ages and Stages Questionnaires, third edition, at intervals of 12, 18, 24, 30, and 36 months. Stabilized inverse probability-weighted generalized estimating equation models were employed to estimate odds ratio (OR) and 95% confidence interval (CI).

Results: 9195 (10.5%), 9,051 (10.3%), and 11,837 (13.5%) children were reported to have atopic dermatitis, asthma, and food allergy, respectively. The findings showed no notable association between atopic dermatitis and asthma and the development of communication, gross motor, fine motor, problem-solving, and personal-social skills within the first three

years of life. However, children with food allergies showed an increased likelihood of experiencing gross motor delay compared to those without food allergies (weighted adjusted OR: 1.14; 95% CI: 1.04–1.24; $p = 0.003$). An association between food allergy and problem-solving skills was observed at the age of 2 years (weighted adjusted OR: 1.20; 95% CI: 1.03–1.41; $p = 0.017$). Despite this, no significant association of food allergy with other developmental domains was observed.

Conclusion: While early childhood allergies may not have a pronounced impact on neurodevelopmental delays, there is a potential association observed between food allergies and delays, particularly in gross motor skills. However, comprehensive investigations are necessary to achieve a deeper understanding of the neurodevelopment linked to these conditions.

Keywords: Allergic diseases, atopic dermatitis, asthma, food allergy, and neurodevelopmental disorders