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## Is Hen's Egg Allergy Decreasing Among Japanese Children in Nurseries?

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The prevalence of food allergy is increasing in industrialized countries worldwide [1], although the exact reasons for this increase remain unknown. Since 2015, however, cumulative data have shown that early introduction of allergenic foods, such as peanuts [2], hen's eggs [3], and cow's milk [4], can prevent the development of food allergy. In accordance with these promising results, early introduction of allergenic foods to infants started to be recommended in guidelines around the world [5]. In Japan, a proposal for preventing hen's egg allergy was announced by the Japanese Society of Pediatric Allergy and Clinical Immunology (JSPACI) in 2017. The introduction of small amounts of boiled hen's egg under medical supervision was recommended from 6 months of age to infants with atopic dermatitis, who had higher risk of developing hen's egg allergy (HEA). Also in 2019, a Japanese guideline regarding breastfeeding and weaning from the Ministry of Health, Labour and Welfare (MHLW) was revised to indicate that weaning should be started at 5-6 months of age and that no scientific evidence currently supports delaying the introduction of allergenic foods as a means of preventing food allergy. This advice is expected to be widely adopted [6], as many health professionals have started to advise caregivers to follow the guidelines. Therefore, we must ask whether this recommendation has led to reductions in the frequency of food allergy.

In 2013, we performed a questionnaire-based survey of all licensed nurseries in Shiga Prefecture, Japan to assess the management of food-allergic children [7]. In 2021, we repeated the same survey to identify changes in the situation. In both studies, the frequency of children with food allergy was recorded. We took advantage of this opportunity to determine the change in prevalence of food allergy among children attending nurseries during this period, when the proposal and revised guideline were issued in Japan.

In 2013 and 2021, a questionnaire on the management of children with food allergy was distributed to all licensed nurseries in Shiga Prefecture, Japan. The questionnaire included questions on the number and age of children with

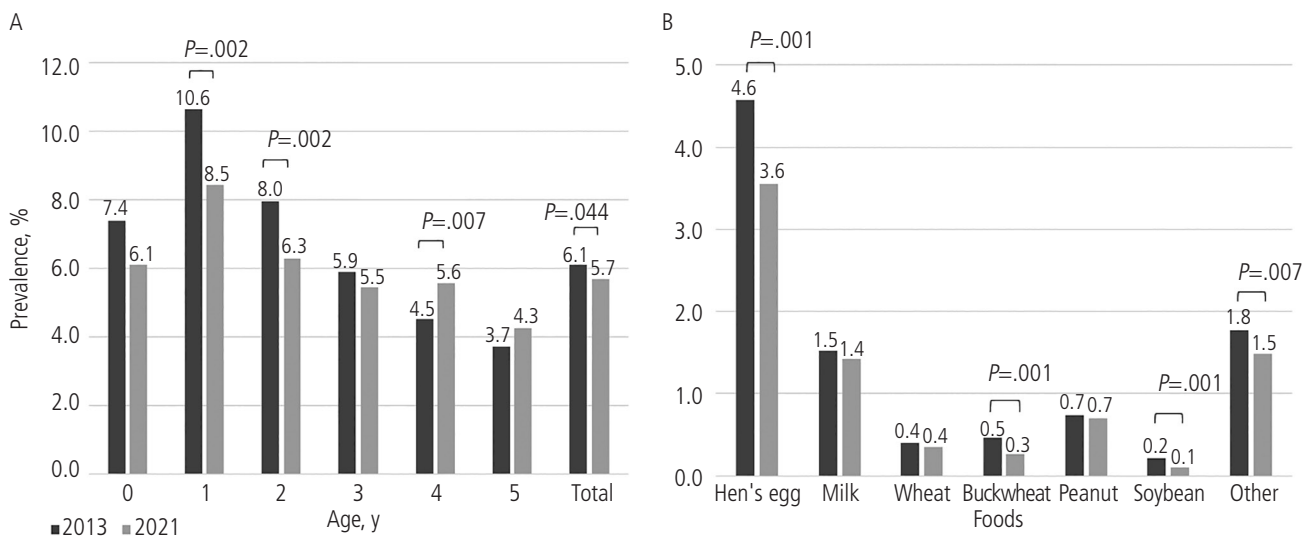


Figure. Prevalence of food allergy among children in nurseries by age (A) and causative allergen (B).

food allergy. Children with food allergy were defined as those recommended to avoid a specific food by a physician, with written instructions. The kinds of foods avoided were also determined. The  $\chi^2$  test was used to compare results between 2013 and 2021 (SPSS Statistics for Windows, Version 27.0, IBM Corp). Two-tailed values of  $P < .05$  were considered statistically significant. The study was approved by the Ethics Committee of Ryukoku University (approval no. 2021-15). Written informed consent was obtained from all the nurseries involved.

Completed questionnaires were recovered from 237 of the 264 nurseries surveyed in 2013 (recovery rate, 89.8%), and from 261 of the 350 nurseries surveyed in 2021 (recovery rate, 74.6%). The numbers of children attending these nurseries were 26 210 in 2013 and 30 047 in 2021. The total prevalence of food allergy decreased from 6.1% in 2013 to 5.7% in 2021 ( $P = .044$ ) (Figure, A). The prevalence increased among 4- and 5-year-old children, but decreased among 0-, 1-, and 2-year-old children. Statistically significant differences were observed at 1 year ( $P = .002$ ), 2 years ( $P = .002$ ), and 4 years ( $P = .007$ ). When prevalence was compared according to avoided foods, significant decreases were observed for hen's egg ( $P < .001$ ), buckwheat ( $P < .001$ ), soybean ( $P < .001$ ), and other foods ( $P = .007$ ) (Figure, B).

The declining trend in food allergy seen here is in line with a survey by Tokyo Prefecture showing a decrease at age 3 years from 17.1% in 2014 to 14.9% in 2019. Moreover, according to our data, the decrease was most prominent for hen's egg. Interestingly, the prevalence of food allergy started to decrease among children aged  $\leq 2$  years. Children who were 2 years old in 2021 were born in 2019, when the revised MHLW guideline for breastfeeding and weaning was issued, and 2 years had passed since the JSPACI proposal for early introduction of hen's eggs to children's diets. It is therefore tempting to speculate that the decrease was, at least partially, caused by the adoption of the recommendations by caregivers. The data imply the effectiveness of the "early introduction"

and "no delay in introduction" approaches for the prevention of food allergy.

The main strengths of this study were the high response rate obtained from licensed nurseries in Shiga Prefecture and the fact that data from large numbers of children in nurseries could be analyzed without selection bias. Furthermore, data from different time points were obtained from the same area using the same methods, enabling analysis of trends over time. A limitation of the study was that the definition of food allergy was based solely on reports from the participating nurseries. Definitions were identical for both time points and included strict avoidance of causative foods based on diagnosis and instructions from physicians, thus enabling direct comparisons. However, it is still possible that the decrease was caused by the decrease in unnecessary avoidance, rather than real food allergy, owing to the recommendation for early intake. In any case, the recommendation might work to decrease the number of children who must avoid specific foods. Another limitation was that the data were obtained from only 1 prefecture in Japan. A larger-scale nationwide survey is warranted to confirm this declining trend.

In conclusion, based on 2 consecutive surveys of licensed nurseries in Shiga Prefecture, Japan, a decreasing prevalence of food allergy, most prominently for hen's egg allergy, was observed. The trend was evident for children born in and after 2019, which was approximately when the "early introduction" and "no delay in introduction" guidelines for allergenic foods were first promoted.

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### *Conflicts of Interest*

The authors declare that they have no conflicts of interest.

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