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Hand eczema as a risk factor for food allergy among occupational kitchen workers

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OKW occupational kitchen workers

NOKW non-occupational kitchen workers

ABSTRACT

Background: An increasing number of studies in children is highlighting the importance of transdermal routes of exposure to food allergens through damaged skin in the pathogenesis of food allergies. However, data on this in adults are limited. A few case-series studies has documented development of food allergy among kitchen workers with hand eczema after direct contact exposure to foods.

Methods: To explore the significance of hand eczema as a risk factor for food allergies in adults at the epidemiological level, we performed a cross-sectional web-based questionnaire survey on kitchen workers whose exposures were classed as occupational (cooks and food handlers, n = 1592) or non-occupational (housewives, n = 1915). Logistic regression was used to explore the association between the presence/severity of hand eczema and the risk of food allergy after adjustment for potential confounders.

Results: Current hand eczema and current diagnosed food allergy were more common among occupational kitchen workers (OKW) than among non-occupational kitchen workers (NOKW) (32.3%-vs-29.9% and 9.9%-vs-3.8%, respectively). Current hand eczema was significantly associated with increased risk of current diagnosed food allergy in OKW (adjusted odds ratio 2.4, 95% CI 1.6–3.7). Those with more severe hand eczema were more likely to suffer from allergic symptoms for foods, and diagnosed food allergy.

Conclusions: This study illustrates a significant public health problem in the adult population, documenting a major impact of hand eczema on the ongoing adult food allergy epidemic.

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Introduction

A growing number of studies suggest that a transdermal route of exposure to food allergens via damaged skin is important for the pathogenesis of food allergy in children.^{1–4} This has been well-documented for the relationship between infant atopic dermatitis and allergy to egg, milk, and peanuts.⁵ However, studies on this topic in adults are limited, and the situation is a little different than in children^{6,7} in that the most common causes of adult food allergy worldwide are more likely to be fruits and other plant foods, such as apples, peaches, and hazelnuts rather than egg, milk or peanuts.^{8–11} In most cases, the primary sensitizers for fruit allergies

are inhaled pollen allergens, which are cross-reactive with the relevant food allergens.¹² Hence, the respiratory route of sensitization has the strongest impact on adult food allergy epidemics.^{9,13–15} In general, sensitization to food-related proteins via the mucosa of the nose or conjunctiva as a cause of the development of food allergy is common in adults. An example of this which is more or less unique to adults is food allergy associated with sensitization to food-related proteins contained in cosmetics or personal care products.^{16,17} In Japan, we have recently experienced more than 2000 cases of wheat allergy in women using facial soap containing hydrolyzed wheat protein.^{18–21} In this case, the major route of sensitization to wheat-related protein is considered to be the mucosa of the eyelids, conjunctiva, or nose, not the skin of the face (in view of the accompanying eyelid swelling and nasal symptoms, not wheals on the face, as the most common symptom after wheat ingestion).^{18,20} As far as we know, the significance of transdermal exposure to food allergens via damaged skin as the major risk factor for food allergy has in general not been as well-documented in the literature in adults than children, except for

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the latex-fruit allergy syndrome. In this case, the presence of hand eczema has been documented as a significant risk factor for sensitization to latex proteins.^{22,23}

Occupational hand eczema is a common health problem in cooks, food handlers and kitchen staff^{24–27}; a similar problem is also sometimes seen in non-occupational kitchen workers (i.e. housewives).^{28,29} A few case-series studies suggests that direct contact exposure to food through inflamed/damaged skin of the hand could be causing the development of food allergies among such kitchen workers with occupational hand eczema.^{30–32} Considering that such kitchen work is a relatively common occupation among adults, it is possible that the contribution of direct contact exposure to food through damaged hands on the current epidemic of adult food allergy is not negligible. However, epidemiological studies regarding this topic have been limited so far.

To establish the epidemiological relationship between the presence and severity of hand eczema, and the risk of food allergy among kitchen workers, we performed a cross-sectional questionnaire-based survey of occupational versus non-occupational kitchen workers, recruited from a large-scale web-based research panel. The primary subjects of this study were occupational kitchen workers (OKW) because they are very frequently exposed to foods as part of their job, and represent a group at high risk for the development of allergies after transdermal exposures. As comparators, we also included non-occupational kitchen workers (NOKW, i.e. housewives), in this study as a population with a lower but not absent risk of transdermal exposure.

Methods

Study design

A cross-sectional questionnaire-based survey of occupational or non-occupational kitchen workers aged 20–54 yr was performed.

Both occupational and non-occupational kitchen workers were selected from people living in Japan using a large-scale web-based research panel (Macromill, Tokyo, Japan). The number of subjects aged 20–54 yrs in the research panel is approximately 1.3 million, one of the largest in Japan. Members of research panels are voluntary registrants who have agreed to answer various web-based survey questions for a small fee (Membership point). Detailed characteristics of this population have been published previously.²⁰ The Ethics Committee of Sagami National Hospital approved the study protocol (No. 160104).

Web-based survey

Figure 1 shows the protocol for the web-based survey. First, the research company sent e-mails inviting participation in the screening survey in order to identify OKW and NOKW. The screening survey consisted of 3 questions regarding occupation (QS1 to QS3, shown in Supplementary Methods). Subjects were considered as OKW if they had indicated “work that involves frequently processing food or cooking food, including cutting, boiling, broiling, serving, etc.” in their responses to QS1 “Are you currently engaged in any of the following in your profession or part-time job?” or QS2 “Have you done any of the following as part of your full-time job or part-time job for at least one consecutive year in the last 5 years?” Subjects were considered as NOKW if they met the following two criteria: i) not indicating “work that involves frequently processing food or cooking food, including cutting, boiling, broiling, serving, etc.” in their responses to QS1 or QS2, and ii) indicating “More than five times a week” in their responses to QS3 “On average, how often do you cook at home (e.g., cutting vegetables or meat using a knife, cleaning and gutting fish, etc.) for yourself or your family during a one-week period?”

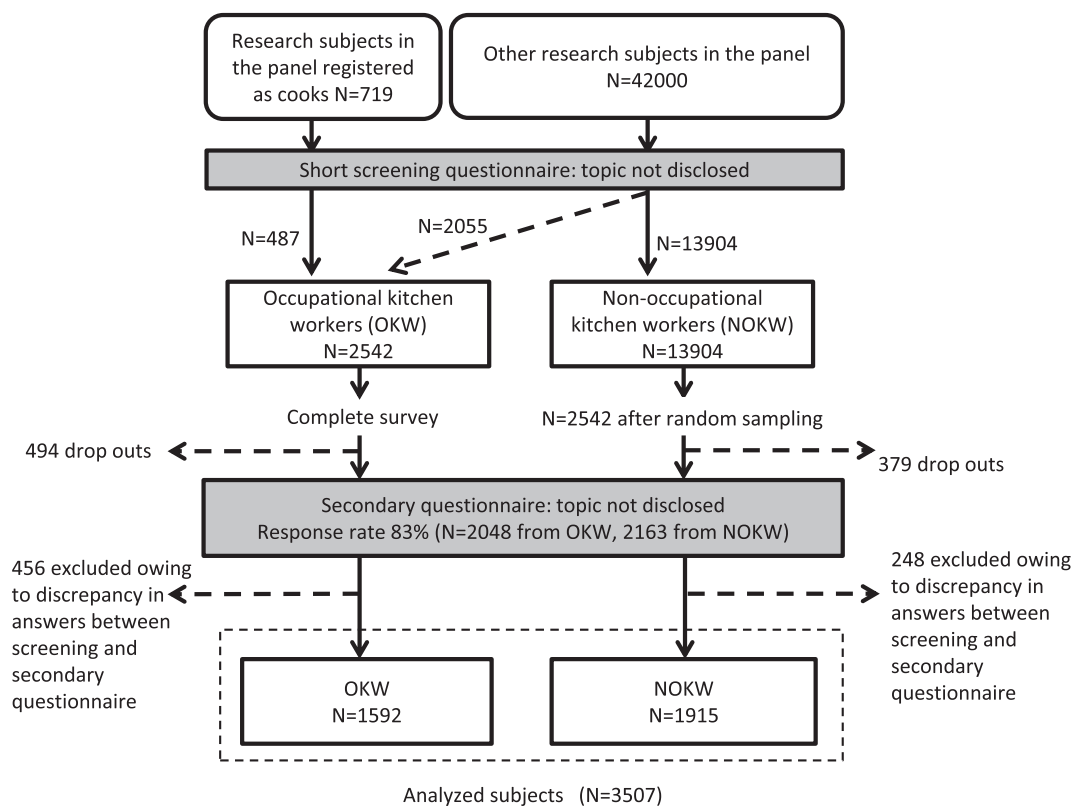


Fig. 1. Protocol of web-based survey.

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