

Short Communication

Comparison of the prevalence and characteristics of food hypersensitivity among adolescent and older women

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Background and Objectives: Although food hypersensitivity is a public health concern, its documentation among the elderly is limited. The current study aims to compare the prevalence and characteristics of food hypersensitivity among adolescent women between aged 18-24 with among older women >50 years of age. **Methods and Study Design:** 660 female university students between the ages of 18 and 24 who volunteered were enrolled as adolescent subjects. 470 women >50 years old who visited the Health Care Centre of Kyoto Katsura Hospital for health check-ups were enrolled as the older subjects. A questionnaire created by ourselves asking the presence of food hypersensitivity, symptoms, causative food, personal or family history of other allergic disorders was distributed. **Results:** The prevalence of food hypersensitivity was statistically similar between adolescent (8.2%) and older women (8.9%). Among them, only 24.1% of the adolescent women and 26.2% of the older women had been diagnosed by physicians as having food allergy. The main causative foods (fruits, shellfish and fish) and the manifestations relating to food hypersensitivity were almost identical between adolescent and older women. In both adolescent and older women, food hypersensitivity positive group showed significantly higher prevalence of personal or family history of allergic disorders than that in food hypersensitivity negative group. **Conclusions:** These data indicate that food hypersensitivity in older women should be given more attention because the prevalence of this condition was as common as that in adolescent women.

Key Words: food hypersensitivity, questionnaire, prevalence, adolescent women, older women

INTRODUCTION

Food allergy (FA) or food hypersensitivity (FH) is a major public health concern in both developed¹ and developing countries.² FA usually occurs through an immune response, mostly mediated by IgE, after the ingestion of a specific food. Although the term FH is often used in the same way as FA, FH is more commonly used to describe adverse food reactions including food intolerance.³ Because of the difficulties in accurately diagnosing FA, the prevalence of FH has been instead extensively investigated in epidemiological studies with respect to adverse food reactions. Although there have been numerous reports on the prevalence of FH in children and adolescents^{4,5} and adults,⁶ studies that dealt with the elderly population are limited. An ageing society has become a reality in most developed countries including Japan; therefore, the research targeting the older population is important. Since previous studies demonstrated that the prevalence of FH is higher in women than in men,⁶⁻¹⁰ the current study focused on comparing the prevalence and characteristics of FH among adolescent and older women.

MATERIALS and METHODS

Subjects

Female adolescents were studied at Nara Women's University and Beppu University during autumn of 2014.

First, a questionnaire on FH that was created by ourselves was distributed to 724 female university students between the ages of 18 and 24 who volunteered. After collecting 673 subjects, 13 subjects with incomplete answers were excluded; finally 660 (91.2%) subjects were enrolled. Older women were studied at the Health Care Centre of Kyoto Katsura Hospital during autumn of 2015. The same questionnaire was distributed to all women >50 years old who visited the facility for their health check-ups. Out of 591 subjects, 501 returned the questionnaire. After excluding 31 subjects because of incomplete answers, the number of enrolled subjects was 470 (79.5%). This study was independently approved by the ethical committees of the three facilities participating in the current study.

Questionnaire

The items listed in the questionnaire were: age, presence

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of FH, personal or family history of allergic disorders, if the subject has FH, diagnosis of FH as FA by physicians, causative food, symptoms and age of onset. For judging the presence of FH, the question of "Have you experienced any skin, oral, digestive or respiratory manifestations after ingestion of specific food during the past one year?" was asked. The family histories of the parents and siblings were considered for the adolescents, whereas the histories of the parents, siblings and children were considered for older women. Allergic disorders included bronchial asthma, atopic dermatitis, allergic rhinitis and pollinosis.

Statistics

The differences among the adolescent and older women,

or the FH-positive and -negative groups were evaluated by the Chi-square test. When the number of subjects was less than ten, Fisher's exact test was used. All statistical analyses were conducted using the SPSS version 19.0 (IBM, Tokyo, Japan). *p* values of <0.05 were considered to be statistically significant.

RESULTS

Comparison of the prevalence and characteristics of FH in adolescent and older women

The self-reported prevalence of FH was 8.2% (54 out of 660 subjects) in adolescents and 8.9% (42 out of 470 subjects) in the older women, demonstrating no statistical difference (Table 1). Among them, only 24.1% of the adolescents and 26.2% of the older women had been di-

Table 1. Comparison of the prevalence and characteristics of food hypersensitivity among adolescent and older women

	Adolescent women	Older women	<i>p</i> value*
N	660	470	
Age (year) †	20 (18-24)	66 (51-87)	
Food hypersensitivity			0.65
Yes	54 (8.2)‡	42 (8.9)	
No	606 (91.8)	428 (91.1)	
Food allergy diagnosed by physicians			0.81
Yes	13 (24.1)	11 (26.2)	
No	41 (75.9)	31 (73.8)	
Age of onset of food hypersensitivity (year)			
≤12	28 (51.9)		
13-18	26 (48.1)	4 (9.5)	
19-30		4 (9.5)	
31-40		9 (21.4)	
41-50		10 (23.8)	
51-60		4 (9.5)	
61-87		5 (11.9)	
Unknown		6 (14.4)	
Personal history of allergy other than food hypersensitivity			0.95
Yes	44 (81.5)	34 (81.0)	
No	10 (18.5)	8 (19.0)	
Personal history of pollinosis			0.047
Yes	25 (46.3)	28 (66.7)	
No	29 (53.7)	14 (33.3)	
Family history of food hypersensitivity			0.37
Yes	27 (50.0)	21 (50.0)	
No	25 (46.3)	13 (31.0)	
Unknown	2 (3.7)	8 (19.0)	
Family history of allergy other than food hypersensitivity			0.41
Yes	45 (83.3)	29 (69.0)	
No	9 (16.7)	9 (21.4)	
Unknown	0	4 (9.5)	
Causative food#			
Fruits	20 (37.0)	17 (40.5)	0.83
Shellfish	16 (29.6)	8 (19.0)	0.34
Fish	6 (11.1)	5 (11.9)	1.00
Egg	6 (11.1)	3 (7.1)	0.73
Milk products	5 (9.3)	2 (4.8)	0.46
Soba	3 (5.6)	7 (16.7)	0.099
Soybean	3 (5.6)	1 (2.4)	0.63
Sites of manifestations§			
Skin	28 (51.9)	23 (54.8)	0.84
Oral cavity	26 (48.1)	19 (45.2)	0.83
Digestive system	14 (25.9)	9 (21.4)	0.64
Respiratory system	13 (24.1)	3 (7.1)	0.03
Shock	3 (5.6)	2 (4.8)	1.00

†Median and range (in brackets) are shown.

‡Number in parentheses indicates the percentage.

§Multiple answers were allowed.

**p* values were calculated by the Chi-square test. When the number of subjects was less than ten, Fisher's exact test was used.

Table 2. Comparison of personal and family history among food hypersensitivity- positive and -negative populations in adolescent or older women

	Food hypersensitivity		p value*
	(+)	(-)	
Adolescent women			
Personal history of allergy other than food hypersensitivity			<0.0001
Number of subjects [†]	54	606	
Yes	44 (81.5) [‡]	310 (51.2)	
No	10 (18.5)	296 (48.8)	
Personal history of pollinosis			0.011
Number of subjects	54	606	
Yes	25 (46.3)	179 (29.5)	
No	29 (53.7)	427 (70.5)	
Family history of food hypersensitivity			<0.0001
Number of subjects	52	593	
Yes	27 (51.9)	98 (16.5)	
No	25 (48.1)	495 (83.5)	
Family history of allergy other than food hypersensitivity			0.0005
Number of subjects	54	599	
Yes	45 (83.3)	356 (59.4)	
No	9 (16.7)	243 (40.6)	
Older women			
Personal history of allergy other than food hypersensitivity			0.0004
Number of subjects	42	428	
Yes	34 (81.0)	224 (52.3)	
No	8 (19.0)	204 (47.7)	
Personal history of pollinosis			0.0036
Number of subjects	42	428	
Yes	28 (66.7)	185 (43.2)	
No	14 (33.3)	243 (56.8)	
Family history of food hypersensitivity			<0.0001
Number of subjects	34	375	
Yes	21 (61.8)	71 (18.9)	
No	13 (38.2)	304 (81.1)	
Family history of allergy other than food hypersensitivity			0.037
Number of subjects	38	388	
Yes	29 (76.3)	229 (59.0)	
No	9 (23.7)	159 (41.0)	

[†]Number of subjects in each column is different because several subjects answered unknown and they were excluded in the analysis.

[‡]Number in parenthesis indicates the percentage.

*p values were calculated by the Chi-square test.

agnosed by physicians as having FA. Although the prevalence of personal and family histories of allergic disorders was comparable between the two groups, a personal history of pollinosis was significantly higher in the older women. As shown in Table 1, the main causative foods in order of fruits, shellfish and fish, and sites of manifestations except for respiratory manifestations were similar between adolescents and the older women.

Comparison of the positivity of personal or family history of allergic disorders in food hypersensitivity positive and negative groups in adolescent and the older women

When the prevalence of personal and family allergic disorders in relation to FH was compared in the FH-positive and -negative groups, the prevalence was significantly higher in the FH-positive groups in both adolescent and the older women (Table 2).

DISCUSSION

FA is a disorder commonly observed in the general population; however, the exact diagnosis is difficult. As stated by the guidelines of NIAID, food challenge is the gold standard for the diagnosis of FA.³ However, a food chal-

lenge has the disadvantage of requiring careful performance under the supervision of a physician and may not be suitable in an epidemiological study with a large population. Rona et al arranged the measures for diagnosing FA into five categories: self-reported, specific IgE-positive, skin prick test-positive, self-reported with sensitization and food challenge-positive in their meta-analysis.¹¹ They found that there were many studies using food challenges; however, a major contribution for the prevalence estimates was based on self-reported symptoms and the skin prick test. Understandably, estimation only by self-reports tended to overestimate the prevalence of FA.¹²

Recent reviews summarizing the prevalence of FH in adults have demonstrated that the prevalence was approximately between 5% and 20%.^{6,11} The rate of perceived FH largely varied across different countries. However, among the studies listed in these reviews, those that were focused on the elderly population are considerably limited. In the current study, we have shown that the prevalence of FH in the older population aged >50 years (8.9%) was lower than the overall prevalence of approximately 13% presented in the meta-analysis by Rona et al.¹¹ On the

other hand, the prevalence was not statistically different from that in adolescents (8.2%) that was comparable with a report on female university students (6.3%) by Yoneyama and Ono.¹³ FH-positive subjects in both adolescent and older women had significantly higher positive personal and family histories of allergic disorders than their counterparts. Furthermore, the FH-positive populations in both adolescent and older women had significantly higher percentages of pollinosis than FH-negative counterparts, suggesting the possibility of association of pollen-associated reactions. These results were in line with the report by Schäfer et al.⁷ The rank order of possible causative foods was similar between the adolescent and the older women, but showed a contrast with reports from other countries, where nuts and vegetables were identified as main causative allergens.^{6,7} Of interest, Chang et al reported an increasing tendency of peanut sensitization in Singaporean children.¹⁴ Finally, previous investigators reported that allergic disorders other than FA are more common in the FH-positive population.^{9,10} Our current data are in line with these previous reports, suggesting the genetic background in the occurrence of FH not only in the adolescent but in older women.

There are several limitations in the current study. This study is based on the self-reported questionnaire. Although food challenge tests are unable to be done in all subjects, more objective tests such as specific-IgE measurement or skin prick test had better be included. The methodology using the questionnaire, however, is still used in a recent epidemiological survey of prevalence of FH.^{15,16} Second, subjects for the study of adolescents were collected as volunteers. Therefore, the possibility of selection bias should be considered. In spite of these limitations, to the best of our knowledge, the current study compared the prevalence and characteristics of food hypersensitivity in adolescent and older women for the first time. Considering the ageing society in developed countries including Japan, FH in the older women should be given more attention because the prevalence of FH was as common as FH in adolescent women.

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AUTHOR DISCLOSURES

The authors declare no conflict of interest.

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青年和老年女性食物过敏的患病率及特点比较

背景与目的：虽然食物过敏是一个公共健康问题，但在老年人中进行的研究有限。本研究的目的是比较 18-24 岁的青年女性和 50 岁以上的老年女性食物过敏的患病率和特点。**方法与研究设计：**纳入研究的青年研究对象是 660 名年龄在 18-24 岁自愿参加的女大学生，老年研究对象是 470 名到京都桂医院保健中心进行健康体检的 50 岁以上的女性。采用自编问卷询问研究对象食物过敏的发生、症状、致敏食物、个人或家族其它过敏性疾病史。**结果：**青年女性和老年女性食物过敏的患病率之间的差异无统计学意义，分别为 8.2%和 8.9%。她们当中，只有 24.1%的青年女性和 26.2%的老年女性被医生诊断为食物过敏。青年女性和老年女性的致敏食物（水果、贝类和鱼类）和食物过敏的表现几乎相同。与食物过敏阴性组相比，青年女性和老年女性的食物过敏阳性组均显示出较高的个人或家族过敏性疾病史。**结论：**这些数据表明，老年女性食物过敏和年轻女性一样常见，应给予更多的关注。

关键词：食物过敏、问卷调查、患病率、青年女性、老年女性