

Dairy food, calcium and vitamin D intake and prevalence of allergic disorders in pregnant Japanese women

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SUMMARY

SETTING: Epidemiological evidence for the associations between intake of dairy products, calcium and vitamin D and allergic disorders has been inconsistent.

OBJECTIVES: To examine such associations in Japan.

DESIGN: This cross-sectional study enrolled 1745 pregnant women. The definitions of wheeze and asthma were based on European Community Respiratory Health Survey criteria, whereas those of eczema and rhinoconjunctivitis were based on International Study of Asthma and Allergies in Childhood criteria. Information on dietary factors was collected using a validated self-administered diet history questionnaire.

RESULTS: Intake of total dairy products, milk, yoghurt, cheese and calcium was not related to the prevalence of wheeze, asthma, eczema or rhinoconjunctivitis. After

adjustment for potential confounders, vitamin D intake was found to be independently positively associated with the prevalence of asthma: the adjusted ORs for asthma in the first, second, third and fourth quartiles were respectively 1.00 (reference), 1.26 (95%CI 0.65–2.50), 2.08 (95%CI 1.13–3.94), and 1.82 (95%CI 0.97–3.51, P for trend = 0.03). There were no relationships between vitamin D consumption and the prevalence of wheeze, eczema or rhinoconjunctivitis.

CONCLUSIONS: These findings suggest that vitamin D intake may be positively related to the prevalence of asthma in young adult Japanese women.

KEY WORDS: asthma; cross-sectional study; intake; Japanese women; vitamin D

EPIDEMIOLOGICAL EVIDENCE regarding the association between the intake of dairy food and allergic disorders has been inconsistent.^{1–16} Several studies in children have shown a significant inverse relationship between intake of any type of dairy food and asthma, wheeze, eczema or rhinitis,^{1–6} whereas a null association has been found in studies in adults^{8–10} as well as other studies of children.^{11–14} A significant positive association between intake of cheese, ice cream and/or yoghurt, and the prevalence of asthma has been observed in young Australian adults.⁸ Of the three pre-birth cohort studies that have examined the relationship between maternal dairy intake during pregnancy and the risk of allergic disorders in the offspring,^{7,15,16} only a single Japanese study showed a significant inverse relationship between maternal dairy product intake and the risk of infantile wheeze.⁷

Epidemiological studies of the association between calcium intake and allergic disorders have been limited and inconsistent.^{1,7,8,17,18} A significant inverse re-

lationship has been observed between calcium intake and the prevalence of wheeze in Greek children.¹⁷ In the abovementioned Japanese prebirth cohort study, maternal calcium intake during pregnancy was inversely associated with infantile wheeze.⁷ No association was observed between calcium intake and asthma in two studies of adults^{8,18} and in one study in children.¹ Maternal intake of vitamin D during pregnancy was inversely related to the risk of any type of allergic disorder in children in four studies.^{7,19–21} On the other hand, significant positive relationships have been found between vitamin D intake or vitamin D supplementation in infancy and all of the allergic disorders examined.^{22,23}

The present cross-sectional study examined the association between intake of dairy foods, calcium and vitamin D and the prevalence of allergic disorders in Japanese pregnant women using baseline data from the Kyushu Okinawa Maternal and Child Health Study (KOMCHS).

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STUDY POPULATION AND METHODS

Subjects

The KOMCHS is an ongoing prospective prebirth cohort study. The KOMCHS requested that 131 obstetric hospitals in Fukuoka Prefecture, the largest prefecture on Kyushu Island in southern Japan, with a total population of approximately 5.04 million, provide as many pregnant women as possible with a set of leaflets explaining the KOMCHS, an application form to participate in the study and a self-addressed and stamped return envelope during the period from April 2007 to March 2008. From May 2007 to March 2008, the KOMCHS also requested that 40 obstetric hospitals in Okinawa Prefecture, an island in the southernmost area in Japan with a total population of nearly 1.37 million, provide pregnant women with a similar set of materials. To increase the sample size, pregnant women living in six prefectures on Kyushu Island other than the Fukuoka Prefecture, with a total population of approximately 8.22 million, were provided with a similar set of materials at 252 obstetric hospitals from August 2007 to March 2008. Pregnant women who intended to participate in the KOMCHS returned the application form to the data management centre. When all responses were tallied, a total of 1757 pregnant women between the 5th and 39th weeks of pregnancy had provided fully informed written consent to participate and had completed the baseline survey. Twelve women were excluded due to incomplete data on the variables under study, and data on a final 1745 pregnant women were available for analysis.

The ethics committee of the Faculty of Medicine, Fukuoka University approved the KOMCHS.

Measurements

In the baseline survey, each participant filled out a set of two self-administered questionnaires and mailed them to the data management centre. Research technicians completed missing or illogical data by telephone interview.

Dietary habits during the preceding month were assessed using a self-administered, semi-quantitative, comprehensive diet history questionnaire (DHQ).^{24,25} Estimates of daily intake of foods (150 items in total), energy and selected nutrients were calculated using an ad hoc computer algorithm for the DHQ^{24,25} based on the Standard Tables of Food Composition in Japan.²⁶ Total dairy product intake was defined as the sum of milk, yoghurt and cheese intake. As only a small number of subjects used supplemental calcium (5.6%) on a weekly or more frequent basis, information on the supplement was not incorporated into the analysis. In a validation study of 92 Japanese women and 92 Japanese men, Pearson's correlation coefficients between the DHQ and 16-day weighed dietary records were respectively 0.56 and 0.65 for

calcium and 0.54 and 0.37 for vitamin D (S. Sasaki, unpublished observations, 2006). Energy-adjusted intake by the residual method was used for the analyses.²⁷ Body mass index (BMI) was calculated as kg/m².

A second self-administered questionnaire included questions on wheeze and asthma based on the European Community Respiratory Health Survey (ECRHS)²⁸ as well as questions on eczema and rhinoconjunctivitis based on the International Study of Asthma and Allergies in Childhood (ISAAC).^{29,30} The presence of wheeze was defined as a positive response to the question, 'Have you had wheezing or whistling in your chest at any time in the last 12 months?'. The presence of asthma was defined as the existence of either of two conditions: an asthma attack during the last 12 months or current use of asthma medication. Affirmative answers to the following three questions were required to indicate the presence of eczema: 'Have you ever had an itchy rash which was coming and going for at least 6 months?', 'Have you had this itchy rash at any time in the last 12 months?' and 'Has this itchy rash affected any of the following places at any time: the folds of the elbows, behind the knees, in front of the ankles, under the buttocks, or around the neck, ears, or eyes?' The presence of rhinoconjunctivitis was defined as a positive response to the following two questions: 'In the last 12 months, have you had a problem with sneezing or a runny or blocked nose when you did not have a cold or flu?' and 'In the last 12 months, has this nose problem been accompanied by itchy/watery eyes?' The questionnaire also elicited information on age, gestation, region of residence, number of children, smoking habits, second-hand smoke exposure at home and at work, family history of asthma, atopic eczema and allergic rhinitis, household income and education. A family history of asthma, atopic eczema or allergic rhinitis, including Japanese cedar pollinosis, was considered to be present if one or more parents or siblings of the study subjects had been diagnosed by a physician as having any of these allergic disorders.

Statistical analysis

Intake of the dietary factors under investigation was divided into quartile ranges based on distribution among all study subjects. Age, gestation, region of residence, number of children, smoking, second-hand smoke exposure at home and at work, family history of asthma, atopic eczema and allergic rhinitis, household income, education and BMI were selected *a priori* as potential confounding factors.

Estimations of crude odds ratios (ORs) and 95% confidence intervals (CIs) of allergic disorders for each quartile range of dietary intake of the factors under study in comparison with the lowest quartile were made by means of logistic regression analysis. Multiple logistic regression analysis was used to adjust for potential confounding factors. Trend of association

was assessed by a logistic regression model assigning consecutive integers (1 to 4) to the quartiles of the exposure variables. All computations were performed using SAS Version 9.2 (SAS Institute, Inc, Cary, NC, USA).

RESULTS

The prevalence values of wheeze, asthma, eczema and rhinoconjunctivitis in the past 12 months were respectively 10.5%, 5.5%, 13.0% and 25.9% among the 1745 pregnant women. The mean age of the participants and gestation at baseline were respectively 31.2 years and 18.5 weeks (Table 1). Mean daily total energy consumption and energy-adjusted intake of total dairy products, calcium and vitamin D during pregnancy were respectively 7434.2 kJ, 142.8 g, 502.8 mg and 5.7 µg (Table 2).

Compared with being in the first quartile, being in the fourth quartile for yoghurt intake was significantly associated with a lower prevalence of wheeze, but not asthma, showing a clear inverse linear trend in crude analysis (Table 3). After adjustment for the confounders under study, however, this inverse association completely disappeared. Intake of total dairy products, milk and cheese was not related to the prevalence of wheeze or asthma in the multivariate model. There were no measurable associations between calcium intake and the prevalence of wheeze or asthma.

Table 1 Distribution of selected characteristics of 1745 pregnant women, Kyushu Okinawa Maternal and Child Health Study, Japan

Variable	n (%)
Age, years, mean ± SD	31.2 ± 4.3
Gestation, weeks, mean ± SD	18.5 ± 5.4
Region of residence	
Fukuoka Prefecture	971 (55.6)
Other than Fukuoka Prefecture in Kyushu	592 (33.9)
Okinawa Prefecture	182 (10.4)
Having one or more children	1042 (59.7)
Having ever smoked	563 (32.3)
Ever experienced second-hand smoke exposure at home	1315 (75.4)
Ever experienced second-hand smoke exposure at work	1106 (63.4)
Family history of asthma	330 (18.9)
Family history of atopic eczema	303 (17.4)
Family history of allergic rhinitis	759 (43.5)
Household income, yen/year	
<4 000 000	632 (36.2)
4 000 000–5 999 999	618 (35.4)
≥6 000 000	495 (28.4)
Education, years	
<13	428 (24.5)
13–14	577 (33.1)
≥15	740 (42.4)
Body mass index, kg/m ² , mean ± SD	21.4 ± 2.8

SD = standard deviation.

Table 2 Distribution of daily intake of dairy products, calcium and vitamin D among 1745 pregnant women, Kyushu Okinawa Maternal and Child Health Study, Japan*

Variable	Mean (SD)
Total energy, kJ	7434.2 (2057.0)
Total dairy products, g	142.8 (125.0)
Milk, g	102.9 (111.9)
Yoghurt, g	34.8 (39.5)
Cheese, g	5.1 (6.9)
Calcium, mg	502.8 (172.7)
Vitamin D, µg	5.7 (3.0)

* Nutrient and food intake were adjusted for total energy intake using the residual method.
SD = standard deviation.

Higher vitamin D intake was independently positively associated with the prevalence of asthma, but not wheeze: the adjusted ORs for asthma in the first, second, third, and fourth quartiles were respectively 1.00 (reference), 1.26 (95%CI 0.65–2.50), 2.08 (95%CI 1.13–3.94) and 1.82 (95%CI 0.97–3.51, *P* for trend = 0.03).

No material associations were observed between intake of total dairy products, milk, yoghurt or cheese and the prevalence of eczema or rhinoconjunctivitis in the multivariate model (Table 4). Moreover, there were no evident relationships between intake of calcium or vitamin D and the prevalence of eczema or rhinoconjunctivitis after adjustment for confounders.

DISCUSSION

Our results in relation to dairy food intake are in agreement with those among previous studies that have found no relationships between dairy intake and any of the allergic disorders examined,^{8–14} but are not consistent with those of studies showing an inverse^{1–6} or positive⁸ association. The discrepancies among studies may be explained, at least in part, by differences in the study populations and designs, dietary assessment methods, definitions of allergic disorders and confounders.

In a prebirth cohort study in Japan, higher maternal calcium intake during pregnancy was significantly associated with a reduced risk of wheeze, but not eczema, in children aged 16–24 months.⁷ A cross-sectional study of Greek children aged 24–72 months found that higher calcium intake was significantly associated with lower prevalence of both history of wheeze and current wheeze, but not diagnosed asthma.¹⁷ Calcium intake was not related to risk of asthma in a case-control study of Saudi Arabian children.¹ In a cross-sectional study of young Australian adults, no significant relationship was found between calcium intake and asthma.⁸ A case-control study of Spanish adults found no statistical difference in calcium intake between asthma patients and controls.¹⁸ In an ecological study using data from the ISAAC study, calcium from vegetables was significantly

Table 3 ORs and 95% CIs for wheeze and asthma in relation to dietary intake of dairy products, calcium and vitamin D for 1745 pregnant women, Kyushu Okinawa Maternal and Child Health Study, Japan

Variable*	Wheeze			Asthma		
	Prevalence %	Crude OR (95%CI)	Adjusted OR (95%CI) [†]	Prevalence %	Crude OR (95%CI)	Adjusted OR (95%CI) [†]
Total dairy products						
Q1 (29.1)	12.2	1.00	1.00	5.7	1.00	1.00
Q2 (85.8)	9.6	0.77 (0.50–1.18)	0.85 (0.54–1.32)	6.2	1.09 (0.62–1.91)	1.28 (0.72–2.29)
Q3 (155.5)	10.1	0.81 (0.53–1.24)	0.94 (0.60–1.45)	5.5	0.96 (0.54–1.71)	1.14 (0.63–2.08)
Q4 (257.1)	10.1	0.81 (0.53–1.24)	0.89 (0.57–1.39)	4.6	0.79 (0.43–1.44)	0.91 (0.48–1.70)
<i>P</i> for trend		0.38	0.71		0.39	0.73
Milk						
Q1 (8.9)	10.3	1.00	1.00	5.1	1.00	1.00
Q2 (49.8)	12.6	1.25 (0.83–1.91)	1.27 (0.83–1.96)	6.7	1.34 (0.76–2.40)	1.43 (0.80–2.59)
Q3 (112.5)	8.5	0.81 (0.51–1.27)	0.84 (0.52–1.34)	6.0	1.19 (0.67–2.16)	1.31 (0.72–2.40)
Q4 (194.7)	10.5	1.02 (0.66–1.58)	1.06 (0.68–1.67)	4.4	0.86 (0.45–1.60)	0.90 (0.47–1.71)
<i>P</i> for trend		0.59	0.75		0.57	0.71
Yoghurt						
Q1 (3.9)	13.1	1.00	1.00	7.6	1.00	1.00
Q2 (13.3)	10.3	0.77 (0.50–1.16)	0.78 (0.51–1.20)	5.3	0.68 (0.39–1.17)	0.70 (0.39–1.22)
Q3 (33.6)	10.1	0.75 (0.49–1.13)	0.87 (0.56–1.35)	4.1	0.53 (0.29–0.94)	0.62 (0.33–1.13)
Q4 (80.1)	8.5	0.62 (0.40–0.95)	0.69 (0.43–1.10)	5.0	0.65 (0.37–1.12)	0.76 (0.42–1.36)
<i>P</i> for trend		0.03	0.18		0.07	0.29
Cheese						
Q1 (0.1)	9.6	1.00	1.00	5.5	1.00	1.00
Q2 (2.2)	12.2	1.30 (0.85–2.00)	1.36 (0.88–2.13)	6.7	1.22 (0.70–2.15)	1.25 (0.71–2.24)
Q3 (4.0)	8.3	0.85 (0.53–1.35)	0.90 (0.55–1.45)	4.6	0.83 (0.45–1.52)	0.87 (0.46–1.62)
Q4 (11.4)	11.9	1.27 (0.83–1.96)	1.36 (0.87–2.14)	5.3	0.95 (0.53–1.72)	1.02 (0.55–1.87)
<i>P</i> for trend		0.66	0.47		0.57	0.74
Calcium						
Q1 (336.3)	9.6	1.00	1.00	4.6	1.00	1.00
Q2 (434.3)	11.2	1.19 (0.77–1.84)	1.24 (0.79–1.95)	7.6	1.70 (0.97–3.07)	1.88 (1.06–3.44)
Q3 (522.7)	11.9	1.27 (0.83–1.96)	1.37 (0.88–2.15)	5.7	1.27 (0.69–2.34)	1.42 (0.77–2.67)
Q4 (678.8)	9.2	0.95 (0.60–1.49)	1.09 (0.68–1.75)	4.1	0.89 (0.46–1.72)	1.07 (0.54–2.10)
<i>P</i> for trend		0.91	0.62		0.51	0.94
Vitamin D						
Q1 (3.1)	11.7	1.00	1.00	3.9	1.00	1.00
Q2 (4.6)	7.6	0.62 (0.39–0.97)	0.64 (0.40–1.02)	4.6	1.19 (0.61–2.32)	1.26 (0.65–2.50)
Q3 (5.9)	10.8	0.91 (0.60–1.39)	0.97 (0.62–1.49)	7.3	1.95 (1.08–3.65)	2.08 (1.13–3.94)
Q4 (8.5)	11.9	1.02 (0.68–1.54)	1.13 (0.74–1.74)	6.2	1.62 (0.88–3.08)	1.82 (0.97–3.51)
<i>P</i> for trend		0.56	0.30		0.051	0.03

* Quartile medians are shown in g/day, except for calcium (mg/day) and vitamin D (µg/day); adjusted energy intakes using the residual method are given in parentheses.

[†] Adjustment for age, gestation, region of residence, number of children, smoking, second-hand smoke exposure at home and at work, family history of asthma, atopic eczema and allergic rhinitis, household income, education and body mass index.

OR = odds ratio; CI = confidence interval.

inversely related to wheeze and eczema, but not to rhinoconjunctivitis.³¹ The current results regarding calcium intake are in partial agreement with these observations.

In a cohort study of 123 Swedish children, higher dietary intake of vitamin D from 5 to 10 months of age was significantly associated with an increased risk of eczema, but not of atopic respiratory illness, up to 6 years of age.²² In a cohort study in Finland, subjects who had received vitamin D supplementation regularly during the first year compared to those who had received it irregularly or not at all had a significantly increased risk of allergic rhinitis and had a marginally significantly increased risk of asthma at 31 years of age.²³ On the other hand, four prebirth cohort studies in Japan, the United States, the United Kingdom, and Finland found a significant inverse relationship between maternal vitamin D intake in

pregnancy and the risk of any of the allergic disorders examined in the offspring.^{7,19–21} Meta-analyses of the data from these four prebirth cohort studies^{7,19–21} have revealed that higher maternal vitamin D intake during pregnancy was associated with reduced odds of wheeze: the pooled OR was 0.56 (95%CI 0.42–0.73).³² This suggests that the effects of vitamin D intake before birth on allergic disorders might be beneficial, whereas postnatal effects might be detrimental. However, a UK prospective study has reported that children whose mothers had higher serum concentrations of 25 (OH)-vitamin D in late pregnancy had a significantly increased risk of visible eczema on examination at 9 months and asthma at 9 years of age.³³

The strengths of the current study include the homogeneity of study subjects in terms of them all being pregnant and the comprehensive assessment of potential confounders. However, we could not control

Table 4 ORs and 95% CIs for eczema and rhinoconjunctivitis in relation to dietary intake of dairy products, calcium and vitamin D for 1745 pregnant women, Kyushu Okinawa Maternal and Child Health Study, Japan

Variable*	Eczema			Rhinoconjunctivitis		
	Prevalence %	Crude OR (95% CI)	Adjusted OR (95% CI) [†]	Prevalence %	Crude OR (95% CI)	Adjusted OR (95% CI) [†]
Total dairy products						
Q1 (29.1)	15.1	1.00	1.00	28.7	1.00	1.00
Q2 (85.8)	11.0	0.69 (0.46–1.03)	0.70 (0.46–1.05)	24.8	0.82 (0.61–1.11)	0.78 (0.57–1.06)
Q3 (155.5)	13.8	0.90 (0.61–1.31)	0.92 (0.62–1.35)	25.7	0.86 (0.64–1.16)	0.85 (0.63–1.16)
Q4 (257.1)	11.9	0.76 (0.51–1.12)	0.76 (0.50–1.14)	24.5	0.81 (0.60–1.09)	0.81 (0.59–1.11)
<i>P</i> for trend		0.33	0.37		0.21	0.29
Milk						
Q1 (8.9)	13.5	1.00	1.00	27.5	1.00	1.00
Q2 (49.8)	14.7	1.10 (0.75–1.61)	1.07 (0.73–1.59)	25.2	0.89 (0.66–1.20)	0.83 (0.61–1.13)
Q3 (112.5)	11.5	0.83 (0.55–1.24)	0.85 (0.56–1.28)	26.8	0.97 (0.72–1.30)	0.93 (0.68–1.26)
Q4 (194.7)	12.1	0.88 (0.59–1.31)	0.88 (0.58–1.32)	24.0	0.83 (0.61–1.13)	0.82 (0.60–1.12)
<i>P</i> for trend		0.30	0.33		0.34	0.34
Yoghurt						
Q1 (3.9)	14.2	1.00	1.00	26.4	1.00	1.00
Q2 (13.3)	11.9	0.82 (0.55–1.21)	0.79 (0.53–1.18)	26.8	1.02 (0.76–1.38)	1.05 (0.77–1.42)
Q3 (33.6)	12.4	0.85 (0.58–1.26)	0.85 (0.57–1.28)	27.3	1.05 (0.78–1.41)	1.02 (0.75–1.40)
Q4 (80.1)	13.3	0.92 (0.63–1.36)	0.88 (0.59–1.33)	23.1	0.84 (0.62–1.14)	0.83 (0.60–1.15)
<i>P</i> for trend		0.74	0.65		0.32	0.29
Cheese						
Q1 (0.1)	11.9	1.00	1.00	28.0	1.00	1.00
Q2 (2.2)	16.3	1.44 (0.98–2.12)	1.41 (0.95–2.09)	23.4	0.79 (0.58–1.07)	0.77 (0.56–1.05)
Q3 (4.0)	10.6	0.87 (0.57–1.33)	0.87 (0.56–1.33)	24.1	0.82 (0.60–1.11)	0.82 (0.60–1.12)
Q4 (11.4)	13.0	1.11 (0.74–1.66)	1.02 (0.68–1.55)	28.2	1.01 (0.75–1.36)	1.00 (0.74–1.36)
<i>P</i> for trend		0.74	0.51		0.90	0.88
Calcium						
Q1 (336.3)	13.1	1.00	1.00	26.4	1.00	1.00
Q2 (434.3)	14.7	1.14 (0.78–1.68)	1.08 (0.73–1.61)	26.8	1.02 (0.76–1.38)	0.97 (0.71–1.31)
Q3 (522.7)	12.2	0.92 (0.62–1.37)	0.87 (0.58–1.32)	25.7	0.97 (0.71–1.31)	0.93 (0.68–1.27)
Q4 (678.8)	11.9	0.90 (0.60–1.34)	0.88 (0.58–1.34)	24.7	0.92 (0.68–1.24)	0.91 (0.66–1.25)
<i>P</i> for trend		0.40	0.37		0.51	0.54
Vitamin D						
Q1 (3.1)	15.1	1.00	1.00	26.4	1.00	1.00
Q2 (4.6)	11.9	0.76 (0.51–1.12)	0.74 (0.49–1.10)	24.5	0.91 (0.67–1.23)	0.89 (0.65–1.21)
Q3 (5.9)	11.7	0.74 (0.50–1.10)	0.73 (0.49–1.09)	24.8	0.92 (0.68–1.25)	0.89 (0.65–1.22)
Q4 (8.5)	13.0	0.84 (0.57–1.23)	0.84 (0.56–1.24)	27.9	1.08 (0.80–1.46)	1.06 (0.78–1.44)
<i>P</i> for trend		0.37	0.38		0.60	0.71

* Quartile medians are shown in g/day, except for calcium (mg/day) and vitamin D (µg/day); adjusted energy intakes using the residual method are given in parentheses.

[†] Adjustment for age, gestation, region of residence, number of children, smoking, second-hand smoke exposure at home and at work, family history of asthma, atopic eczema and allergic rhinitis, household income, education and body mass index.

OR = odds ratio; CI = confidence interval.

for external factors such as aeroallergens and air pollution. Definitions of wheeze and asthma were based on the questions in the ECRHS. Furthermore, the prevalence of eczema and that of rhinoconjunctivitis was estimated according to subjects' responses to the questions in the ISAAC study, although validation tests of these questions have not been performed for young Japanese adults.

Several limitations of the current study warrant mention. Our DHQ could only approximate consumption, although the correlation between DHQ results and dietary records is considered reasonable, as mentioned above. The possibility of misclassification would bias the estimates of the associations toward null. Our DHQ was designed to assess dietary intake for 1 month prior to completing the questionnaire. Substantial changes in diet in the previous 1 month were experienced by 502 pregnant women due to

nausea gravidarum ($n = 473$), maternal and foetal health ($n = 27$) and other reasons ($n = 2$). The results of a sensitivity analysis excluding these 502 women were similar to those in the overall analysis: the adjusted OR for asthma in the highest quartile of vitamin D intake was 3.37 (95% CI 1.48–8.43, P for trend = 0.003).

The participation rate could not be calculated, as the exact number of eligible pregnant women who were provided with a set of leaflets explaining the KOMCHS, an application form, and a self-addressed and stamped return envelope by the 423 collaborating obstetric hospitals was not available. We were not able to analyse the differences between participants and non-participants, as information on personal characteristics such as age, socio-economic status and history of allergic disorders was not available for non-participants. It is likely, however, that our subjects

were not a representative sample of Japanese women in the general population. In fact, educational levels in the current study population were higher than in the general population. According to the 2000 population census of Japan, the proportions of women aged 30–34 years in Fukuoka Prefecture with <13, 13–14, ≥ 15 and an unknown number of years of education were respectively 52.0%, 31.5%, 11.8% and 4.8%.³⁴ The corresponding figures for the current study were respectively 24.6%, 33.0%, 42.4% and 0.0%. The present population might therefore have had greater awareness of health topics than the general population.

To our knowledge, there have been no epidemiological studies on the association between vitamin D intake and allergic disorders among adults. Findings from this cross-sectional study of pregnant Japanese women suggest that vitamin D intake may be positively related to the prevalence of asthma. The nature of cross-sectional studies prevents conclusions from being drawn about causality, however. Further epidemiological studies are required to accumulate evidence on the relationship between intake of dairy foods, calcium and vitamin D and the development of allergic disorders.

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R É S U M É

CONTEXTE : Aujourd'hui, les données épidémiologiques concernant l'association entre les maladies allergiques et d'autre part la prise d'aliments lactés, la prise de calcium et de vitamine D ne sont pas cohérentes.

OBJECTIFS : Examiner ce type d'associations au Japon.

SCHÉMA : L'observation porte sur 1745 femmes enceintes. Les définitions du sifflement et de l'asthme reposent sur les critères de l'Enquête de Santé Respiratoire de la Communauté Européenne alors que celles concernant l'eczéma et la rhino-conjonctivite reposent sur les critères de l'Etude Internationale de l'Asthme et de l'Allergie chez l'Enfant. Les informations sur les facteurs diététiques ont été colligées au moyen d'un questionnaire d'anamnèse diététique validé et auto-administré.

RÉSULTATS : Il n'y a pas de relation entre la prise de produits lactés totaux, de lait, de yoghourt, de fromage

et de calcium et la prévalence du sifflement, de l'asthme, de l'eczéma ou de la rhino-conjonctivite. Après ajustement pour les facteurs confondants potentiels, la prise de vitamine D s'avère en association positive indépendante avec la prévalence de l'asthme. Les OR ajustés pour l'asthme au cours des premier, deuxième, troisième et quatrième quartiles ont été respectivement de 1,00 (référence), 1,26 (IC95% 0,65–2,50), 2,08 (IC95% 1,13–3,94) et 1,82 (IC95% 0,97–3,51 ; P pour la tendance = 0,03). On n'a pas trouvé de relation entre la consommation de vitamine D et la prévalence de sifflement, d'eczéma ou de rhino-conjonctivite.

CONCLUSIONS : Ces observations suggèrent que la prise de vitamine D peut être en relation positive avec la prévalence de l'asthme chez les jeunes femmes japonaises.

R E S U M E N

MARCO DE REFERENCIA: Los datos epidemiológicos existentes sobre la asociación entre la ingesta de productos lácteos, calcio y vitamina D y los trastornos alérgicos son discordantes.

OBJETIVOS: Analizar estas correlaciones en el Japón.

MÉTODO: Participaron en el estudio 1745 mujeres embarazadas. Las definiciones de sibilancias y asma se basaron en los criterios del estudio sobre salud respiratoria de la Comunidad Europea y las definiciones de eczema y rinoconjuntivitis se tomaron del estudio internacional de asma y alergia en la niñez. Se recogió la información sobre los factores nutricionales mediante un cuestionario autoadministrado validado de los antecedentes dietéticos.

RESULTADOS: No se observó ninguna relación entre la

ingesta total de productos lácteos, leche, yogurt, queso y calcio y la prevalencia de sibilancias, asma, eczema ni rinoconjuntivitis. Tras corregir los posibles factores de confusión, se encontró que la ingesta de vitamina D se asociaba en forma independiente y positiva con la prevalencia de asma: el cociente de posibilidades ajustado para el asma fue en el primer cuartil 1,00 (referencia), en el segundo cuartil 1,26 (IC95% 0,65–2,50), en el tercero 2,08 (IC95% 1,13–3,94) y en el cuarto cuartil 1,82 (IC95% 0,97–3,51) con una tendencia $P = 0,03$. No se observó correlación entre el consumo de vitamina D y la prevalencia de sibilancias, eczema ni rinoconjuntivitis.

CONCLUSIÓN: Estos resultados indican que la ingesta de vitamina D guarda una correlación positiva con la prevalencia de asma en las mujeres jóvenes japonesas.