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Atopy, wheeze and bronchial responsiveness in young chilean adults. Do dietary antioxidants matter?

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Key words: antioxidants; asthma; atopy; bronchial responsiveness; flavonoids.

The current high prevalence of asthma may be related to the dietary pattern observed in many western countries, characterized by lower consumption fish,

fresh fruits and vegetables rich in antioxidants, accompanied by high consumption of foods rich in saturated fatty acids, sugars and salt (1). This study assessed whether the intake of specific dietary antioxidants is associated with the prevalence of asthma, bronchial responsiveness (BHR) and atopy in a population of young adults from Chile.

A total of 1192 adults born between 1974 and 1978 in Limache, a semi-rural area of Central Chile participated in the study. They responded to a Spanish version of the European Community Respiratory Health Survey (ECRHS) questionnaire (2), were skin tested with eight allergens, and challenged with increasing concentrations of methacholine (0.5, 1.00, 4.00, 8.00 and 16 mg/ml) to assess BHR. Dietary intake of antioxidant foods, vitamins, minerals and flavonoids was assessed with a food frequency questionnaire.

Wheeze in the last 12 months, BHR and atopy were the primary outcome measures. BHR was expressed as a continuous measure, the least squares concentration-response slope (3). An increasing slope indicates a worsening BHR. Most food items were studied as the continuous increase in 100 g of their consumption, and garlic was analysed as per 10 g of increase. Nutritional variables were log-transformed and results of logistic regression analyses expressed as per-doubling odds ratio. Total catechins, flavonols and flavones were grouped into quintiles and results presented as trend per quintile. Multiple logistic regression was carried out to test associations between wheeze in the last 12 months, atopy and the exposures, adjusting for confounders [sex, age, current smoking, overcrowding, number of years of education, socio-economic status, weight at birth, body mass index (BMI) and total energy intake (TEI)]. Multiple linear regression analyses were carried out to test associations between BHR and exposure, further adjusting for the confounders forced expiratory vol-

ume (FEV₁) percentage predicted (FEV₁%), the ratio between FEV₁% and the forced vital capacity (FVC), FEV₁%/FVC and atopy (4).

The median BMI was close to 25 cut-off point in the participants. Respiratory symptoms were more common in women than in men with the exception of wheeze. A 25% of participants were sensitized to at least one allergen. BHR prevalence (20% fall in FEV₁ at a concentration of methacholine of up to 16 mg/ml), was twice as common in women. Mean consumption of fresh fruits and vegetables, as well as of all antioxidant nutrients, met or was above the recommended values. Intake of polyunsaturated fatty acids reached the recommended values. The ratio omega 6/omega 3 was 47 : 1.

Very few associations of statistical significance were found between outcomes studied and dietary antioxidants (Table 1). Being atopic was negatively associated with per-doubling intake of omega 3 fatty acids, and with per-quintile increase in intake of catechins. BHR slope was negatively associated with per-doubling intake of vitamin C and garlic. Unexpectedly, a positive association was found between selenium intake and BHR.

This is the first population-based study carried out in a Latin American country assessing the association between dietary intake and several outcomes related to asthma. The few findings here reported lend further support to the current lack of evidence for an eventual beneficial effect of dietary antioxidants on asthma (5). However, the results of this study are suggestive of a beneficial effect of garlic in BHR as well as of catechins in atopy, findings which deserve further research. We also found a modulator effect of an unbalanced intake of omega 6 and omega 3 on the sensitization status of the individual.

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Table 1. Adjusted associations* between atopy, BHR and wheeze in the last 12 months, with food and nutrient intake in young adults

Selected food items and nutrients	Adjusted model		
	Atopy OR (95% CI)	BHR (mg ⁻¹) Regression coefficient (95% CI)	Wheeze OR (95% CI)
Food items†			
Orange	0.99 (0.94 to 1.05)	-0.02 (-0.06 to 0.02)	0.98 (0.92 to 1.04)
Lemon	1.46 (1.00 to 2.15)	-0.07 (-0.36 to 0.22)	0.92 (0.60 to 1.42)
Apple	0.98 (0.89 to 1.08)	0.01 (-0.06 to 0.08)	0.99 (0.89 to 1.09)
Garlic	0.86 (0.68 to 1.08)	-0.18 (-0.32 to -0.04)	0.99 (0.82 to 1.20)
Onion	0.96 (0.78 to 1.18)	0.12 (-0.02 to 0.26)	0.94 (0.76 to 1.16)
Tomato	1.00 (0.95 to 1.05)	-0.03 (-0.06 to 0.01)	0.98 (0.93 to 1.04)
Carrot	0.91 (0.69 to 1.20)	0.02 (-0.16 to 0.20)	1.13 (0.88 to 1.45)
Bean	1.46 (0.78 to 2.71)	-0.08 (-0.53 to 0.38)	0.89 (0.47 to 1.69)
Lentil	0.65 (0.28 to 1.50)	-0.11 (-0.66 to 0.44)	0.68 (0.30 to 1.50)
Selected nutrients and antioxidants‡			
Omega 3	0.92 (0.85 to 0.99)	0.02 (-0.04 to 0.08)	1.03 (0.95 to 1.12)
Ratio omega 6/omega 3	1.08 (1.01 to 1.16)	-0.03 (-0.08 to 0.02)	1.02 (0.97 to 1.07)
Total vitamin A	1.08 (0.94 to 1.24)	0.02 (-0.08 to 0.12)	1.05 (0.91 to 1.20)
Vitamin C	1.04 (0.92 to 1.19)	-0.12 (-0.22 to -0.03)	0.95 (0.83 to 1.08)
Vitamin E	1.10 (0.86 to 1.41)	-0.08 (-0.26 to 0.09)	1.24 (0.97 to 1.59)
Selenium	1.10 (0.78 to 1.55)	0.34 (0.11 to 0.58)	0.87 (0.63 to 1.21)
Total catechins	0.87 (0.78 to 0.96)	-0.03 (-0.10 to 0.04)	1.07 (0.97 to 1.18)
Flavonols	0.95 (0.86 to 1.05)	0.003 (-0.07 to 0.07)	0.97 (0.88 to 1.07)
Flavones	1.01 (0.91 to 1.10)	0.03 (-0.04 to 0.10)	1.07 (0.97 to 1.18)

BHR, bronchial responsiveness; BMI, body mass index; FEV₁, forced expiratory volume; FVC, forced vital capacity; TEI, total energy intake.

*Adjustments for potential confounders: sex, age, current smoking, overcrowding, years of education, socio-economic status, weight at birth, BMI, TEI. Analyses for BHR included further adjustments for FEV₁ percentage predicted, FEV₁%/FVC, and atopy.

†Food items were analysed as per 100 g except garlic, which was analysed as increase per 10 g.

‡Nutrients were analysed as per-doubling increase in intake, and flavonoids as per-quintile intake (mg).

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