

≥75 nmol/L. There was an inverse linear association between vitamin D level and cumulative wheezing by 5 years of age but no association with asthma incidence. Every 10 nmol/L increase in cord-blood 25(OH)D level lowered the cumulative risk of wheezing by the age of 5 years (adjusted OR: 0.95).

CONCLUSIONS. This birth-cohort study revealed an inverse association between 25(OH)D cord-blood levels and the risk of respiratory and other viral infections by the age of 3 months and cumulative risk of wheezing by the age of 5 years. The 25(OH)D cord-blood levels were not associated with the risk of incident asthma.

REVIEWER COMMENTS. The measurement of vitamin D in cord blood, but not at follow-up visits, is a major limitation of this study. Recall bias that resulted from the use of parent questionnaires to detect the outcomes of interest is another limitation. It remains unclear whether low vitamin D levels in utero cause increased respiratory infections and wheezing or if this low level is a marker for likely low vitamin D levels in the future. Further studies are needed to clarify this issue. This study adds to the body of evidence that suggests that low vitamin D levels might play a role in wheezing and respiratory infections in infants and children.

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Dairy Food, Calcium and Vitamin D Intake in Pregnancy, and Wheeze and Eczema in Infants

Miyake Y, Sasaki S, Tanaka K, Hirota Y. *Eur Respir J*. 2010;35(6):1228-1234

PURPOSE OF THE STUDY. Previous studies have provided mixed results regarding a relationship of intake of dairy products with allergic disorders. This study examined the association between maternal consumption of dairy products, calcium, and vitamin D during pregnancy and risk of wheeze and eczema in Japanese children at 16 to 24 months of age.

STUDY POPULATION. A total of 763 mother-child pairs in the Osaka Maternal and Child Health Study (OMCHS) were included.

METHODS. The OMCHS is a prospective cohort study. Participants mailed each of 3 questionnaires to the data center. The first survey was performed on pregnant women between the 5th and 39th weeks of gestation, and the second and third surveys were collected from 2 to 9 and 16 to 24 months after delivery, respectively.

Symptoms of wheeze and eczema were based on the criteria of the International Study of Asthma and Allergies in Childhood.

RESULTS. Higher maternal intake of total dairy products, milk, cheese, and calcium during pregnancy was significantly related to a decreased risk of infantile wheeze but not eczema (adjusted odds ratios [ORs] between extreme quartiles were 0.45 [95% confidence interval (CI): 0.25-0.79], 0.5 [95% CI: 0.28-0.87], 0.51 [95% CI: 0.31-0.85], and 0.57 [95% CI: 0.32-0.99], respectively). Children whose mother had consumed ≥4.3 μg/day of vitamin D, using a cutoff point at the 25th percentile, had a significantly reduced risk of wheeze and eczema (adjusted ORs were 0.64 [95% CI: 0.43-0.97] and 0.63 [95% CI: 0.41-0.98], respectively). However, the inverse associations between maternal intake of calcium in the highest quartile and ≥4.3 μg/day of vitamin D and infantile wheeze were not statistically significant after further control for maternal intake of docosahexaenoic acid or vitamin E.

CONCLUSIONS. Higher consumption of total dairy product, milk, cheese, calcium, and vitamin D during pregnancy might reduce the risk of infantile wheeze. Also, higher maternal vitamin D intake during pregnancy might be protective against eczema.

REVIEWER COMMENTS. The role of vitamin D in atopy and other immune disorders is a hot area of research. The results of this study help to place the importance of diet in pregnancy for atopy in a non-Westernized society. However, the need for long-term follow-up and questionnaire-based definitions for wheeze and eczema were a limitation of this cohort study. Confounders include undisclosed sources of vitamin D and calcium. The relationship between actual vitamin D levels and supplement use during pregnancy is still not conclusive. Additional studies to clarify the multifactorial causes of allergic disorders are desirable, and current randomized double-blind placebo-controlled trials that evaluate vitamin D supplements during pregnancy and wheeze/asthma outcomes are ongoing.

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Vitamin D Serum Levels and Markers of Asthma Control in Italian Children

Chinellato I, Piazza M, Sandri M, Peroni D, Piacentini G, Boner AL. *J Pediatr*. 2011;158(3):437-441

PURPOSE OF THE STUDY. Recent data indicate that increased serum concentrations of 25-hydroxyvitamin D are asso-

ciated with higher percent-predicted forced expiratory volume in 1 second (FEV₁) and forced vital capacity (FVC). These researchers sought to establish the relationship between serum vitamin D levels, pulmonary function, and asthma control.

STUDY POPULATION. This was a cross-sectional analysis of Italian children aged 5 to 11 years with asthma (intermittent or persistent) consecutively evaluated at a university hospital-based outpatient clinic in Verona, Italy, in the winter and spring of a single year.

METHODS. Asthma control was classified according to the Global Initiative for Asthma (GINA) guidelines. Children and parents completed the Childhood Asthma Control Test questionnaire. Pulmonary-function testing was performed according to American Thoracic Society guidelines. A single measurement of each child's serum vitamin D level (25-hydroxy cholecalciferol) was obtained.

RESULTS. Of the 75 asthmatic children, 7 (9.4%) had sufficient vitamin D levels (≥ 30 ng/mL), 28 (37.3%) had insufficient levels (20–30 ng/mL), and 40 (53.3%) had deficient levels (< 20 ng/mL). A statistically significant positive correlation ($P = .011$) was found between serum levels of vitamin D and asthma-control scores according to the questionnaire. Serum levels of 25-hydroxyvitamin D were associated with percent-predicted FVC ($P = .04$), but correlation between percent-predicted FEV₁ and vitamin D levels was not significant.

CONCLUSIONS. Deficient and insufficient vitamin D serum levels were found in most asthmatic children in this study. There was a positive association between vitamin D levels and asthma control, and it was observed that lower vitamin D levels were associated with reduced asthma control. These data suggest that higher vitamin D levels are positively associated with pulmonary function, particularly FVC; however, the correlation is relatively weak.

REVIEWER COMMENTS. This study raises the question of whether vitamin D deficiency negatively affects asthma control and pulmonary function. Although the cross-sectional design reveals a correlation between vitamin D insufficiency/deficiency and poor asthma control, it does not prove a causal relationship. As suggested by the authors, interventional studies are warranted to evaluate the effect of vitamin D supplementation in poorly controlled asthmatic patients.

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Swimming Pool Attendance, Asthma, Allergies, and Lung Function in the Avon Longitudinal Study of Parents and Children Cohort

Font-Ribera L, Villanueva CM, Nieuwenhuijsen MJ, Zock JP, Kogevinas M, Henderson J. *Am J Resp Crit Care Med.* 2011;183(5):582–588

PURPOSE OF THE STUDY. Several retrospective studies have identified attending chlorinated swimming pools during childhood as a risk factor for developing asthma and allergies later in life. These researchers collected data on a large birth cohort of children in the United Kingdom.

STUDY POPULATION. Data were available for 5738 children from an initial cohort of 14 062 live births.

METHODS. Data on swimming were collected by questionnaire at ages 6, 18, 38, 42, 57, 65, and 81 months. Data on asthma and allergic conditions were collected at 7 and 10 years. Spirometry and allergy skin testing were performed between the ages of 7 and 8 years. Multiple confounders were considered in the statistical models.

RESULTS. Fourteen percent of the children swam before 4 years of age, and 50% attended pools at least once per week between 4 and 7 years of age. From birth to 7 years of age, children with a high versus low cumulative swimming-pool attendance rate had an adjusted odds ratio of 0.88 (95% confidence interval [CI]: 0.56–1.38) and 0.5 (95% CI: 0.28–0.87) for asthma ever and current asthma, respectively, and a 0.2-SD (95% CI: 0.02–0.39) increase in forced midexpiratory flow. Children with a history of asthma ever, with a high versus low cumulative swimming exposure rate, had an odds ratio of 0.34 (95% CI: 0.14–0.80) for current asthma at the age of 10 years.

CONCLUSIONS. Among those with previous asthma, swimming was associated with decreased asthma symptoms at the age of 10 years. It was also associated with increased lung function at 7 years of age. Swimming did not affect the incidence of asthma.

REVIEWER COMMENTS. The results of this study are a nice addition to the previously available data regarding the impact that exposure to swimming pools and their chemical irritants has on asthma. Swimming was not found to increase asthma or asthma symptoms; in fact, it was protective in some aspects. One weakness of this study was its inability to determine if swimming was linked to other healthy lifestyle characteristics that affected the outcomes.

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