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Papers

Pertussis vaccination in infancy and asthma or allergy in later childhood: birth cohort study

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Some studies have shown a link between vaccination of infants with whole cell inactivated pertussis vaccine and the later development of asthma and atopy.[1 2] These findings were refuted by a randomised controlled trial but with follow up until only 30 months of age.[3] Our previous report of the lack of an association between pertussis vaccination and wheezing disorders was based on outcomes in early childhood.[4] In this study we have examined the association between pertussis vaccination in infancy and asthma or atopy by age 7.5 years in a large, population based birth cohort.

Participants, methods, and results

Participants were the 13 971 children who survived to 1 year in the Avon longitudinal study of parents and children. The study method has been described previously,[5] and details can be found on the study website (www.alspac.bris.ac.uk). We obtained the vaccination status for each child from the child health surveillance database. We categorised children with regard to pertussis as fully vaccinated (completed a primary course of diphtheria, tetanus, and pertussis vaccination), partially vaccinated (completed a primary course of diphtheria and tetanus but did not receive pertussis vaccine) or non-vaccinated (no vaccinations). We excluded other combinations from analysis. We obtained three wheezing outcomes based on parental self report questionnaires (asthma at 69-81 months, wheeze with whistling on the chest at 69-81 months, and asthma diagnosed by a doctor at 91 months) and one atopy outcome based on skin prick tests at age 7 years. We defined atopy as one or more positive reactions (wheal ≥ 2 mm) to a panel of three common allergens. We selected several variables as potential confounders of the relation between exposure and outcome, which were, however, not considered to be in the causal pathway. These were maternal education, maternal smoking during pregnancy, maternal history of asthma or eczema, maternal financial difficulties, damp housing, overcrowding, child's ethnicity, number of siblings, contact with cats in the home, duration of breast feeding, and passive exposure to tobacco smoke from mother's questionnaire data, and birth weight, sex, gestational age, and maternal age at delivery from medical records. We used Pearson's χ^2 (or Fisher's exact test if the predicted number of subjects in any category was less than five) for our data analysis of univariable associations between vaccination status and possible confounders and principal outcomes. We used multivariable logistic regression models to evaluate associations between immunisation status and asthma and allergy outcomes while controlling for potential confounders.

Vaccination history was available for 13 810 children, of whom 13 109 (94.9%) were fully vaccinated, 446 did not have pertussis vaccination (340 non-vaccinated; 106 partially vaccinated), and 255 had some other combination. The table shows numbers of subjects with outcome data for each of the principal outcomes. The cumulative prevalence of asthma diagnosed by doctors was 20.3% (n = 1597) at 91 months. The prevalence of reported asthma at 69-81 months was 12.4% (n = 1024), reported wheeze with whistling at 69-81 months 9.8% (n = 798) and atopy at 7 years 20.5% (n = 1324). The table shows the adjusted and unadjusted odds ratios and 95% confidence intervals from logistic regressions for each of the principal outcomes. Although unadjusted analyses showed significant associations (asthma at 69-81 months, P = 0.05; doctor diagnosed asthma, 91 months, P = 0.005), it should be noted that, because of small numbers in some groups, the confidence intervals were wide and the results did not support the hypothesis. When we adjusted for potential confounding factors we detected no significant associations (P = 0.1-0.8).

Comment

These findings confirm and extend our previous observations of the lack of an independent association between pertussis vaccination in infancy with inactivated, whole cell vaccine and the subsequent development of asthma or atopy during later childhood.

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Ethical approval: Avon Longitudinal Study of Parents and Children Ethics and Law Committee.

A supplemental table is on bmj.com

Table Odds ratios with 95% confidence intervals for outcome variables according to pertussis vaccination status

Outcome variable	Non-vaccinated*	Partially vaccinated†	Fully vaccinated‡	P value
Asthma at age 69-81 months (1024/8240)				
Prevalence in % (No/total)	8.2 (12/146)	20.3 (14/69)	12.4 (998/8025)	
Unadjusted	1.00	2.84 (1.24 to 6.53)	2.05 (0.8 to 5.23)	0.05
Adjusted	1.00	1.59 (0.88 to 2.97)	1.06 (0.58 to 1.95)	>0.1
Periods of wheeze at age 69-81 months (798/8114)				
Prevalence in % (No/total)	9.0 (13/144)	16.2 (11/68)	9.8 (774/7902)	
Unadjusted	1.00	1.95 (0.82 to 4.6)	1.09 (0.62 to 1.94)	0.2
Adjusted	1.00	1.55 (0.55 to 4.37)	0.94 (0.50 to 1.78)	0.2
Doctor diagnosed asthma at age 91 months (1597/7850)				
Prevalence in % (No/total)	15.8 (23/146)	36.2 (21/58)	20.3 (1553/7667)	
Unadjusted	1.00	3.03 (1.51 to 6.09)	1.36 (0.87 to 2.13)	0.005
Adjusted	1.00	1.93 (0.86 to 4.33)	0.98 (0.61 to 1.58)	0.1
Atopy at age 7 years (1324/6463)				
Prevalence in % (No)	17.7 (22/124)	15.4 (6/39)	20.6 (1296/6300)	
Unadjusted	1.00	0.84 (0.32 to 2.26)	1.20 (0.75 to 1.91)	0.6
Adjusted	1.00	1.05 (0.35 to 3.21)	1.18 (0.69 to 2.03)	0.8

*No primary vaccinations, including pertussis.
†Diphtheria and tetanus ≥3 doses and no pertussis.
‡Triple (diphtheria, tetanus, and pertussis) vaccine ≥3 doses.

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