Pertussis Vaccination Is Not Associated with a Higher Prevalence of Allergies in Six-Year-Old Children from West Germany

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The association between pertussis vaccination and allergies as seen in epidemiological studies is unclear. Studies in the U.S. and in New Zealand, where vaccination coverage was nearly complete, found fewer allergies in the very small group of non-vaccinated children [1, 2]. Two studies in Great Britain found more asthma in the vaccinated than in the not vaccinated group [3, 4]. Two cohort studies found no association with wheezing, asthma or sensitisation in children up to 3 years [5, 6]. Contrary to that the evidence concerning pertussis itself is less conflicting. Studies dealing with the impact of early childhood respiratory infections on allergy in later life all found more asthma and allergies in children having had pertussis [7–10]. From 1974 to 1991 pertussis vaccination was not recommended in West Germany because of alarming reports on the side effects of the vaccine. Therefore the group of children receiving a diphteria and tetanus vaccination (DT) but no diphteria, pertussis and tetanus vaccination (DPT) is fairly big and we are able to compare these both groups with the group of children receiving neither DT nor DPT (NO) vaccination. If pertussis vaccination causes allergies then the prevalence of allergies should be highest in the DPT vaccinated group. Children in the DT or NO group should have comparable prevalences. This was investigated. We use data from our study on school beginners in West Germany where vaccinations, diagnoses of pertussis, allergies and symptoms of allergies have been recorded, atopic eczema has been diagnosed and sensitisation has been measured.

Methods

Study Population

All children on admission to first grade from predefined areas of the West German cities Duisburg, Essen, Cologne, and the small town Borken participated every third year (1991, 1994 and 1997) and children from Augsburg in 1996 in a questionnaire study with identical design. 7923 participated (response 76%). 1991, 1994 and 1997 a subgroup of these children in the same places were asked to give blood for the measurement of total and specific IgE and to undergo a dermatological investigation. The studies took place immediately after the school entrance examination compulsory for all school beginners. They were conducted between February and May of the pertinent years.

The study was approved by the ethical committee of the Medical Association of Saxony Anhalt and Bavaria.
Questionnaire

A questionnaire was sent to the parents along with a letter of invitation from the local health departments. It was to be completed at home and checked by a physician on the day of the investigation. Whether the child ever had received vaccinations against diphteria, tetanus, pertussis, measles, rubella, mumps, and BCG was checked with the vaccination certificate (95% had the certificate available). Parents reported whether a physician ever had diagnosed pertussis, bronchial asthma, hay fever and eczema in the child. We used German translations of ISAAC questions to assess the symptoms of allergies wheezing ever, wheezing in the last 12 months, sneezing with reddened eyes in the last 12 months, itchy skin rash ever and itchy skin rash in the last 12 months. Wheezing in the last 12 months and itchy skin rash were included into the questionnaire in the year 1994.

Information about the following variables was taken from the questionnaire and included in the analysis as potentially confounding: Education of the parents (years of schooling, highest level of the parents was chosen to characterise the family), nationality of the parents (German for at least one of the parents/not German), gender, allergy in father or mother, bedroom sharing, damp flat, smoking of mother in pregnancy and smoking in the child’s home.

Vaccination

The DPT vaccination was not recommended but the DT vaccination only [11]. A DPT vaccination was indicated for specially endangered children: those in day care centres or public homes, those living in poor socio-economic conditions and over-crowd homes and those with a tendency to bronchial illnesses. Basic immunisation was in the 3th, 4th and 5th months of life; a repetition took place after 1 year. Contraindications were illnesses of the central nervous system. 50IE Diphteria toxoid, 50IE Tetanus toxoid and 4IE killed Bordetella pertussis germs were administered. Aluminiumhydroxide and Aluminiumphosphate were used as adjuvants. Preservation was Sodiumtimerfonate.

Atopic Eczema

Trained physicians from the Department of Dermatology and Allergology, Technical University Munich diagnosed atopic eczema according to standardised criteria on the day of the basic examination. In total, 3927 children from West Germany (response: 93%) participated in this investigation.

Determination of Atopic Sensitisation

The concentrations of specific IgE antibodies against birch pollen, grass pollen, mugwort pollen and house dust mites and total IgE were determined in 3411 children (response: 68% of those with a questionnaire). 1991, 1994 and 1996 this test