Allergol Immunopathol (Madr). 2016;44(3):214–220

Allergologia et immunopathologia

Sociedad Española de Inmunología Clínica, Alergología y Asma Pediátrica

www.elsevier.es/ai

ORIGINAL ARTICLE

Prevalence of and risk factors for atopic dermatitis: A birth cohort study of infants in southeast Turkey

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Received 17 March 2015; accepted 31 July 2015
Available online 14 November 2015

KEYWORDS
Atopic dermatitis;
Birth cohort study;
Cord blood;
Food allergy;
Risk factors

Abstract
Background: Atopic dermatitis (AD) is most common in the first year of life. The aim of this study was to determine the prevalence of and risk factors for AD in a birth cohort of infants from southeast Turkey.
Methods: Adana Paediatric Allergy Research (ADAPAR) birth cohort study was derived from 1377 infants who were born in Cukurova University, Medical Hospital, Adana, Turkey between February 2010 and February 2011. At birth, a physical examination was performed, cord blood samples were taken, and the mother completed a baseline questionnaire that provided data on gestational conditions, family history of allergic diseases and environmental exposures. Follow-up visits scheduled at 3, 6, and 12 months included an infant physical examination and an extended questionnaire. Skin prick test was performed and food-specific IgE levels were measured at 6 and 12 months. Atopic dermatitis was diagnosed based on confirmatory examination by a physician.
Results: Of the 1377 infants enrolled, 59 (4.3%) were diagnosed with AD as of 12 months. Maternal allergic disease (ORs 6.28, 95% CI 1.03–38.30; $p = 0.046$), maternal infection during gestation (ORs 3.73, 95% CI 1.25–11.09; $p = 0.018$), and presence of food allergy (ORs 13.7, 95% CI 3.07–61.0; $p = 0.001$) were identified as risk factors for AD. Breastfeeding and cord blood IgE levels were not identified as risk factors.
Conclusions: In this cohort we found prevalence of AD as 4.3% during the first year of life. Positive family history of atopic diseases, prenatal infections and presence of food allergy are the risk factors for early presentation of AD.

Introduction

Atopic dermatitis (AD), also known as ''atopic eczema'' and ''eczema,'' is the most common chronic and recurrent skin disorder of childhood and is being reported with increasing frequency worldwide. The aetiopathogenesis of

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http://dx.doi.org/10.1016/j.aller.2015.07.002

this condition is complex, and disruption of the skin barrier, impaired natural immune responses, and overreaction to allergens and microbial agents are considered to play roles. Environmental factors related to industrial development and abnormal immune response to these factors early in intrauterine life are also thought to contribute.[1]

Research has demonstrated that foetal immunoglobulin E (IgE) production begins at 11 weeks of gestation and that sensitisation to allergens may even begin in utero.[2] Many investigations have been conducted since the first report suggested that high IgE levels in cord blood (CB) could predict future development of allergic disorders; however, the relationship between CB-IgE level and childhood atopic diseases remains controversial.[3] Studies have identified numerous factors that affect CB-IgE but it is still not clear exactly how these levels are influenced by the foetal environment, including maternal, paternal, placenta, and foetal characteristics.[4]

In many countries, birth cohort studies have been carried out to determine the prevalence of and risk factors for AD. These investigations have examined comparable age groups, and the reported prevalence of AD has ranged from 10% to 28%.[1,5] To date, no such study has been done in Turkey and relatively few data are available from southern Europe.[1] The aim of the Adana Paediatric Allergy and Risk Factors (ADAPAR) birth cohort study was to establish the prevalence of AD and identify associated risk factors by following infants in the city of Adana (southeast Turkey) from birth until 1 year of age.

Materials and methods

Study design

The investigation was a population-based, single-centre, birth cohort study with unselected participants. In total 1475 infants born at Çukurova University Medical Hospital in Adana, Turkey were recruited as potential participants between February 2010 and February 2011. The study protocol was approved by the university's Human Research Ethics Committee. Written informed consent was obtained from the parents of each infant who was enrolled.

Multiple evaluations were done at birth and during follow-up (Table 1). At birth, each infant was clinically examined by a physician and CB sampling was performed. Two types of questionnaires related to the infants were administered during the study: baseline (completed by the mother at birth) and follow-up (multiple time points; Table 1). The baseline questionnaire provided information on the mother's gestational conditions (i.e. pre-existing diseases, nutritional supplements, medications, tobacco use), family history of allergic diseases (e.g., asthma, allergic rhinitis, food allergy, and AD), potential allergens in the household (e.g., smoking, pets, mould), and the family's demographic data. Each neonate's birth data (gender, weight, gestational age at birth) were collected from medical reports.

Follow-up visits were scheduled for 3, 6, and 12 months of age. At each visit, the same physician examined the infant and the mother completed an extended follow-up questionnaire. This instrument gathered data on breastfeeding and the infants' diet, as well as infant nutritional supplements, infections, medications, vaccinations, smoking in the house, any signs and symptoms of allergic disease that the mother had observed in her baby. Telephone interviews were conducted when the infants were 9 months of age and the same extended questionnaire was administered at that time. As well, at the 6- and 12-month visits, each infant was scheduled to undergo a skin prick test (SPT) and blood testing for quantification of food-specific (FS) IgE. In every case where a follow-up examination was missed, the mother was contacted and completed the same questionnaire by telephone.

The interview at 12 months of age was completed by the mothers of 1377 (93.3%) of the infants, and this defined the participants who were enrolled in the study.

Cord blood sampling and IgE testing

For each infant, immediately after birth, the umbilical cord was cleansed with a sterile gauze swab and 5 mL of CB were aspirated from the umbilical vein of the placenta into a syringe. Each sample was immediately centrifuged at 3000 rpm for 15 min, and serum was separated and stored $-30\,^{\circ}C$ until it was analysed. Levels of CB-IgE were determined using the ImmunoCAP® Specific IgE test (Unicap, Phadia, Uppsala, Sweden) and results were expressed as kU/L. To ensure results were not confounded by sample contamination with maternal blood, on the same day that the IgE testing was done, each CB serum sample was tested for IgA (expressed as mg/dL) at the Çukurova University Biochemistry Laboratory. In any case where the IgA result was $\geq$11 mg/dL, the infant's CB-IgE result was excluded.

Food-specific IgE testing

Initially, each infant's serum was screened for the six most common food allergens using an ImmunoCAP® kit. If this test was positive, then the serum was analysed for specific IgE antibodies for cow's milk, hen's eggs, soy, wheat, fish, and peanuts. Results $\geq$0.35 kU/L were accepted as positive.

Skin prick test

An SPT was performed using a commercially available extracts of major inhalant allergens (Allergopharma, Germany): tree mixture (alder, hazel, poplar, elm, sallow), mould mixture (*Alternaria alternata*, *Cladosporium herparum*, *Fusarium moniliforme*), pollen mixture (grass, barley, oat, rye, wheat, velvet, orchard, rye, timothy, blue grass, and meadow fescue), *Dermatophagoides pteronyssinus* and *farinae*, and food allergens (milk, egg, wheat, peanut, and banana). The SPTs were performed using standard methods,[6] and the result for each allergen was defined as positive if the mean wheal size was >3 mm larger than the negative control.

Diagnosis of atopic dermatitis and food allergy

Given that the infants were in the first year of life, AD was diagnosed using the simplified criteria established by Williams.[7] Information on AD outcomes was obtained from