Immunoglobulin G and M levels were determined in children having non-allergic or allergic childhood asthma and in age-matched children without respiratory problems. Asthmatic children had higher IgG levels than the age-matched children without respiratory symptoms. Children having nonallergic asthma had lower IgG levels than the allergic group. Although higher concentrations were expected, the level of immunoglobulin M was normal and did not differ between groups having allergic or non-allergic childhood asthma. Low IgG levels (or/and IgA) may account for the susceptibility of asthmatic children to respiratory infections.

Descriptors: CHILDHOOD ASTHMA, SERUM IMMUNOGLOBULINS

INTRODUCTION

Childhood asthma is a special entity and differs from adult asthma. Epidemiological studies suggest an increasing prevalence of childhood asthma. That has been ascribed to an early and increasing exposure to allergens in pregnancy and postnatal period (1, 2). Imbalanced activation of the immunoglobulin heavy chain (IGHH) genes in more hygienic environments with a low pressure of infections has also been invoked (3, 4). A history of atopy in the mother is a risk factor for asthma in the infant, and events in fetal and infant life may lead to the adult illness (5, 6). Fetal and neonatal production of IL13, seem to be important (2, 7).

Development of the disease in childhood may be predicted and checked by an "early treatment of the atopic child" and that decreases the incidence of adult asthma (8). "Gut-associated lymphoid tissue" is an important source for generating information regarding the antigen specific database to the neonatal immune system and is exposed to the antigens due to breast-feeding (9). Allergic asthma in children shows an increase in the total IgE level in serum, which probably occurs due to the genes that regulate basal IgE production (7). In BALF of healthy children the IgG4 concentration was higher (10). Moreover, higher concentration of IgM (in cases of low IgA and IgG) could protect allergic children from infection (11). Etiopathogenetic role of other immunoglobulins is controversial, as well as protective roles of IgA, IgD and IgG (12, 13). The aim of this work was to collect basic information about the IgG and IgM levels in sera of children having nonallergic or allergic childhood asthma.

PATIENTS AND METHODS

The study included children hospitalized in the Department of Pediatrics University Hospital Osijek. There were 79 patients having childhood asthma (moderate-persistent, by GINA guidelines) and 40 control subjects without such symptoms. Asthmatic patients were divided into two groups, allergic and non-allergic. All children assigned to the allergic childhood asthma group had specific IgE antibodies against 5 inhalatory antigens common for eastern Croatia (Slavonia) and high total IgE levels (mean ± standard deviation: 683.85 ± 393.96 KIU/L). Control children were free of asthmatic symptoms and have had normal lung and immunological status.

Children having non-allergic asthma were younger than the allergic ones, the respective median ages were 1 yr 9 mo vs. 5 yr 1 mo (p<0.001). The control group was therefore divided into two comparable subgroups having median ages 2 yr 4 mo and 5 yr 3 mo. The differences between the matched groups were below statistical significance. Immunoglobulins G and M in plasma were measured by radial immunodiffusion assay on Combi-RID plates (Immuno, Vienna, Austria). Concentrations of specific serum IgE antibodies (RAST) were determined by the Phadebas radio-alergo-sorbent test (Pharmacia Dignostics AB, Sweden). Total IgE level in serum was measured by the commercial Delfia kit (Pharmacia Diagnostics AB, Uppsala, Sweden).The level of significance was set at p <0.05.

RESULTS

The general epidemiological trend of increasing asthma incidence is present in the eastern part of Croatia (Slavonia) and its capital Osijek (University Hospital) in...
which this study was performed (Figure 1). As expected, asthma in the family was more frequently reported in the allergic asthma group (14 of 43 patients, 32.6%) than in the non-allergic asthma group (6 of 36 patients, 16.7%); (p ≤0.001). First attacks of asthma occurred significantly earlier in the non-allergic asthma group than in the allergic group (median ages 10 vs. 18 mo; p≤0.005).

Asthmatic patients (both the allergic and non-allergic ones) had higher IgG levels than the age-matched children without respiratory symptoms. Among the asthmatic patients, nonallergic group had lower IgG levels than the allergic group. The serum concentration of IgM in asthmatic children having allergic and non-allergic childhood asthma were in normal ranges and the IgM levels of all four groups (asthmatic and control) were comparable. In non-allergic childhood asthma and allergic asthma group (mean±SD, 1.93±0.63 vs. 1.53±0.59) also in control group (younger/older) (1.39±6.2 vs.1.35±0.49) data on IgM concentration was not statistically significant (p≥0.05) (Table 1).

**DISCUSSION**

High IgG level (10.48 ± 2.77 g/L), and normal IgM level (1.35±0.59) were found in children having allergic asthma. In a similar study, authors compared immunoglobulin levels in children having moderate asthma to those in age-matched healthy children: IgD, IgE and IgM were elevated in asthmatic children whereas IgA and IgG were normal (13). Broncho-alveolar lavage fluids (BALF) of children having chronic chest disease (pneumonia, bronchitis) were reported to contain increased concentrations of IgG, IgA and IgM as compared to healthy controls (12). Allergen-specific IgA and specific IgG subclass were found in BALF and serum of asthmatic children and adults. High levels of IgG autoantibodies against bronchial epithelial cells were detected in adult patients having nonatopic asthma (14-17).

Other studies presented the role of infective agents in asthma and explored antibody responses to them. IgG antibodies against respiratory syncitial virus (RSV) were detected in nasal washes and sputa from infants and wheezing. High titres of IgG to Chlamydia pneumoniae were associated with asthma morbidity. It has been presented that frequent infections may even protect from childhood asthma (3, 18, 19). In conclusion, our finding of increased IgG concentrations in asthmatic children is generally in accordance with selected literature data, normal concentration of IgM (we expected higher concentration) are not. It should be noted, however, that we have measured total IgG and IgM levels. Since an etiopathogenetic role has been postulated for the bacterial infections in

### Table 1

<table>
<thead>
<tr>
<th>Serum IgG and IgM levels in children having allergic or non-allergic childhood asthma</th>
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<tbody>
<tr>
<td>Table 1. Serumske koncentracije IgG i IgM u djece s alergijskom i nealergijskom dječjom astmom</td>
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<table>
<thead>
<tr>
<th></th>
<th>Non-allergic</th>
<th>Allergic</th>
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<tbody>
<tr>
<td><strong>IgG</strong></td>
<td></td>
<td></td>
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<tr>
<td>asthmatic children</td>
<td>8.38 ± 1.93</td>
<td>10.48 ± 2.77</td>
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<td>age-matched children</td>
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<td>9.01 ± 2.32</td>
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<td>0.026</td>
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<tr>
<td><strong>IgM</strong></td>
<td></td>
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<td></td>
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<tr>
<td>asthmatic children</td>
<td>1.39 ± 0.63</td>
<td>1.53 ± 0.59</td>
<td>0.273</td>
</tr>
<tr>
<td>age-matched children</td>
<td>1.39 ± 0.62</td>
<td>1.35 ± 0.49</td>
<td>0.172</td>
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<tr>
<td>djeca iste dobi bez respiratornih simptoma</td>
<td>0.997</td>
<td>0.065</td>
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Figure 1

**New patients having childhood asthma (age 0-7) hospitalized at the University Hospital Osijek, from 1988 to 2000**

asthma, low serum IgG (or/and low IgA) could account for frequent infections in our patients with nonallergic childhood asthma (20).

LITERATURE


Sažetak

KONCENTRACIJA IMUNOGLOBULINA U DJECE S ALERGIJSKOM I NEALERGIJSKOM DJEČJOM ASTMOM

Z. Mandić, M. Sipi, I. Vučemilović-Šimunović, Lj. Pinotić

Ispitivali smo serumске koncentracije IgG i IgM u djece s alergijskom i nealergijskom dječjom astmom i u kontrolnoj skupini djece iste dobi, koja nisu imala respiratornih simptoma. Astmatična djece imala su više koncentracije IgG od kontrolne skupine djece bez respiratornih simptoma. Djece s nealergijskom astmom imala su niže koncentracije IgG od djece s alergijskom dječjom astmom. Iako smo očekivali više vrijednosti IgM, koncentracije IgM bile su niže od nivoa normalnih, i nisu bile vjerojatno značajne u djece s alergijskom i nealergijskom dječjom astmom. Niske koncentracije IgG (i ili IgA) mogu biti razlog osjetljivosti djece s nealergijskom astmom na respiratorne infekcije.

Deskriptori: DJECJA ASTMA, SERUMSKI IMUNOGLOBULINI