Childhood asthma and growth outcome

M SHOHAT, T SHOHAT, R KEDEM, M MIMOUNI, AND Y L DANON

Department of Pediatrics, Division of Pediatric Immunology, Beilinson Medical Center, Petah Tiqva, Sackler School of Medicine, Tel Aviv University, and Israel Defence Forces Medical Corps, Israel

SUMMARY To study the ultimate growth variables of children with asthma we analysed the military medical records of 54,041 boys and 38,102 girls at the age of 17 years. History of asthma was found in 2,252 boys and 1,158 girls, who were then categorised according to three grades of severity. Analysis of their growth was made separately for each sex and for each grade of severity of clinical disease.

Boys who suffered from mild asthma that subsided before adolescence were significantly taller, heavier, and fatter than their respective controls. There was a slight decrement in all three growth variables in correlation with increased severity. The most severely affected patients had retarded height and weight in comparison with the mildly affected children, but the differences were not significant. The same tendency was found in the girls.

Children with asthma will ultimately reach normal height and weight. Those who are mildly affected tend to be even taller and heavier than adolescents without asthma. The severity of the asthma influences final growth.

Children suffering from asthma can show growth retardation both in height and maturation. It has been further suggested that the retarded bone age of most children with severe asthma indicates that they will tend to mature late and will ultimately grow to a normal height.

The purpose of this study was to study the growth variables (height, weight, and body mass index) of children with asthma at the age of 17 years.

Patients and methods

We studied the medical military records of 54,125 boys and 38,185 girls who were examined at the age of 17 years as part of a routine health assessment in the Israeli forces conscription.

Each adolescent underwent a complete physical examination. Growth variables that were studied included height, weight, and body mass index (body mass index = weight/height²).

Adolescents who suffered from bone diseases that might have any influence on growth outcome (severe scoliosis, neuromuscular or bone diseases, neurofibromatosis, etc) were excluded, and thus 54,041 boys and 38,102 girls were left in the study.

As part of the health assessment each adolescent was asked whether he had ever suffered from asthma or any other respiratory disease. Any positive information was confirmed by a letter from the family physician, and the severity of asthma was then categorised according to the following criteria.

Grade A: Recurrent episodes of asthma during childhood; remission of symptoms for over three years.

Grade B: Active asthma without constant or preventive treatment.

Grade C: Active asthma that demanded constant preventive medicine, including sodium cromoglycate, bronchodilators, and inhalation of steroids. A number of children in each group had been given treatment for asthma, including systemic steroids, during childhood.

As the growth variables studied differed according to sex and ethnic groups in Israel the analysis was made separately for each of the six most common ethnic groups. Statistical analysis was made using the Student's t test and χ² test.

Results

The Table depicts the number of adolescents studied with (total and for each grade of severity) and without asthma according to sex and parental origin. The incidence of asthma ranged from 2.3-5.9% for boys and 1.6-3.9% for girls. A significantly (p<0.001) lower incidence of asthma was found in
boys and girls whose parents originated from Morocco (2.3% and 1.6%, respectively) and a higher incidence (p<0.001) in both sexes from west Europe (5.9% and 3.9%, respectively).

Figure 1 depicts the mean (SEM) height, weight, and body mass index, respectively, of the children with asthma in comparison with the controls. Boys with mild asthma (grade A) were significantly taller (p<0.05), heavier (p<0.01), and fatter (p<0.01) than their respective controls. The height of adolescents with moderate asthma (grade B) was also significantly higher (p<0.05) than their controls. There was a slight decrease in all the growth variables studied in correlation with the severity: the most severely affected children had retarded growth in height and weight in comparison with mild cases. Although the same tendency was found for the girls, the differences were not significant. Figure 2 shows the heights of the children with asthma and the controls according to their ethnic origin. The results obtained were similar to those reported above for most ethnic groups, although the differences were not significant (except for the children with mild asthma who originated from east Europe). Analysis of the weight and body mass index according to the parents' origin did not reveal significant differences between the children with and without asthma.

Discussion

Our study suggests that although children with asthma have retardation of growth\textsuperscript{1-7} and maturation,\textsuperscript{1,8} they will ultimately grow to normal height and weight. Of interest is the observation that children with mild asthma tend be become even taller and heavier than children who have not had asthma. As children who mature late are likely to present a slightly taller adult stature when compared with those who mature early\textsuperscript{10,11} the fact that children with asthma often have delayed bone age and adolescence\textsuperscript{1,9} may be the reason for their slightly taller stature. We have not tested whether this observation in our group with asthma was due to an eventual socioeconomic selection; as this difference was observed in all the ethnic groups studied, however, it seems less likely that this is the reason. Asthma is not considered to be related to socioeconomic state.\textsuperscript{1}

It has been shown previously that a relation exists between the severity of symptoms of asthma and the degree of growth retardation.\textsuperscript{1,12} Our study suggests

---

Table  No of adolescents with total and for each grade of severity and without asthma according to parents' origin and sex.

<table>
<thead>
<tr>
<th>Parents' origin</th>
<th>Adolescents without asthma</th>
<th>Adolescents with childhood asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>West Europe</td>
<td>12618</td>
<td>10685</td>
</tr>
<tr>
<td>East Europe</td>
<td>3974</td>
<td>2632</td>
</tr>
<tr>
<td>Iraq</td>
<td>5317</td>
<td>4111</td>
</tr>
<tr>
<td>Yemen</td>
<td>3611</td>
<td>2128</td>
</tr>
<tr>
<td>Morocco</td>
<td>9039</td>
<td>6544</td>
</tr>
<tr>
<td>Others</td>
<td>16427</td>
<td>10242</td>
</tr>
<tr>
<td>Total</td>
<td>51789</td>
<td>36944</td>
</tr>
</tbody>
</table>

---

Fig. 1  Mean (SEM) height, weight, and body mass index of boys and girls with asthma (grades A, B, and C) in comparison with their controls (dotted lines represent the mean of the three grades of asthma).

\*p<0.05, **p<0.01.
Childhood asthma and growth outcome

Without asthma

With asthma (grades A, B, and C)

---

Fig. 2  Comparison between height (mean (SEM)) of adolescents with and without asthma (grades A, B, and C) for parents' origin and sexes (dotted lines represent the mean height of the three grades of asthma).

*p<0.05.

that the severity of the asthma also influences the final growth. Most severely affected patients had retarded growth in height and weight in comparison with the mildly affected children.

We are grateful to Professor A Perzelan, Professor J Kark, and B Lederman for their help.

References


Correspondence to Dr M Shohat, Medical Genetic Center, Cedars Sinai Medical Center, Los Angeles, CA 90048, United States of America.

Received 1 August 1986