

Childhood asthma and growth outcome

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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 2252 boys and 1158 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 height¹⁻⁷ and maturation.⁸ It has been further suggested that the retarded bone age of most children with severe asthma indicates that they will tend to mature late⁹ 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 military medical 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 defence 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 χ^2 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

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

Parents' origin	Adolescents without asthma		Adolescents with childhood asthma					
			Grade A		Grade B		Grade C	
	M	F	M	F	M	F	M	F
West Europe	12618	10685	286	151	341	190	168	96
East Europe	3974	2632	54	35	81	38	43	26
Iraq	5317	4111	113	53	97	46	46	19
Yemen	3611	2128	59	33	53	29	34	14
Morocco	9839	6544	111	49	82	39	34	18
Others	16427	10242	292	132	242	135	116	55
Total	51789	36944	315	453	896	477	441	228

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.

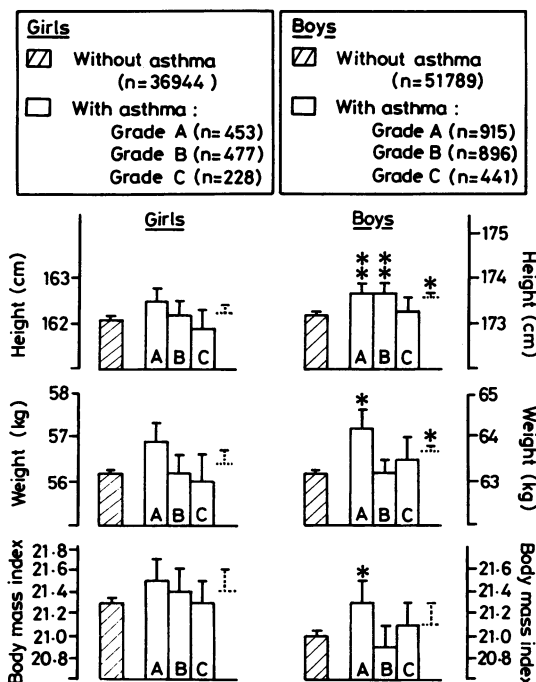


Fig. 1 Mean (SEM) height, weight, and body mass index of boys and girls with asthma (grades A, B, and C) in comparison with their controls (dotted lines represent the mean of the three grades of asthma).

* $p < 0.05$, ** $p < 0.01$.

Discussion

Our study suggests that although children with asthma have retardation of growth¹⁻⁷ and maturation,^{1,8} they will ultimately grow to normal height and weight. Of interest is the observation that children with mild asthma tend to 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^{10,11} the fact that children with asthma often have delayed bone age and adolescence^{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.¹

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

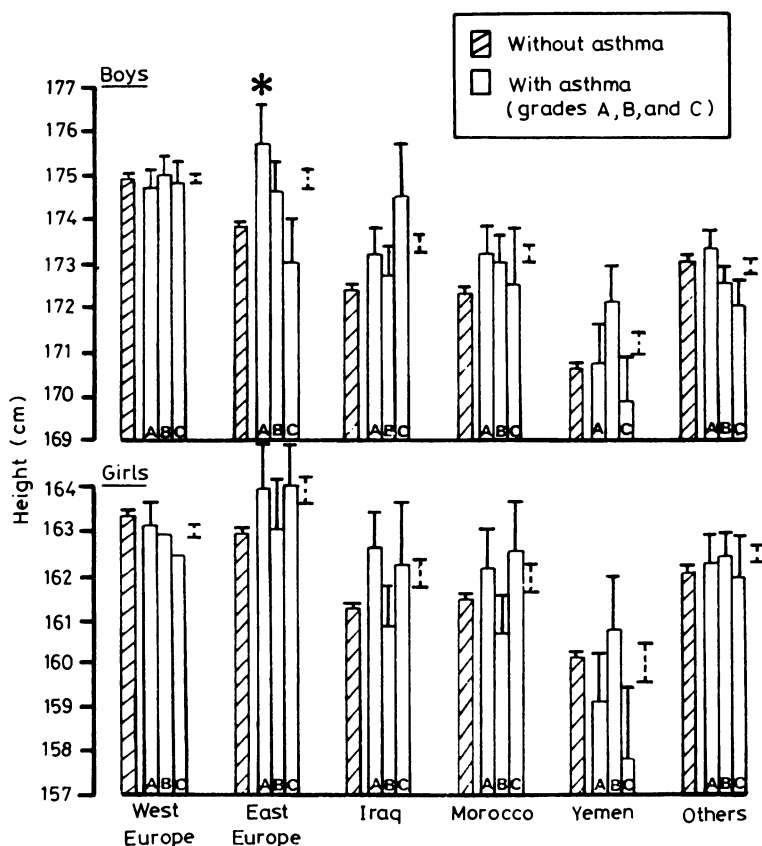


Fig. 2 Comparison between height (mean (SEM)) of adolescents with and without asthma (grades A, B, and C) for parents' origin and sexes (dotted lines represent the mean height of the three grades of asthma).

* $p < 0.05$.

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.

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