

Ministry of Higher Education

and Scientific Research

University of Diyala

College of Medicine



**The impact of asthma on growth in patients
under five years who attending Al-Batool
teaching hospital in Diyala governorate, Iraq**

**Submitted to the Council of the College of Medicine, Diyala University, In
Partial Fulfillment of Requirements for the Bachelor Degree in medicine and
general surgery.**

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2022-2023

Abstract

Objectives: To investigate the effect of asthma on growth in children under 5 years old in Diyala governorate, Iraq.

Subject and methods: cross sectional study on the asthmatic patients in Al-batool teaching hospital in the period from July 2022 to January 2023. A questionnaire of personal information was prepared for this purpose, The questions include the data of patients and ages, genders, weight, the existence of other comorbidities, the birth order, socioeconomic state, etc. we collected the data by direct face to face interview with the mothers. the privacy of the patients identities was preserved. we used electronic balance to measure their weight in grams and we calculated the length by using tape measure.

Results: 70 asthmatic patients were enrolled in this study. 54.3% of them were males and 46.7% were females. Their mean age was 29.12 months. Their mean weight was 12.68 kg and their mean length was 84.8 cm. 37% of them had history of decrease weight compared to other normal children, 14.3% of them complained from malnutrition and 17% of them had slow growth in length compared to other normal children. 94% of them had previous hospital admission due to asthma attacks and 31.4% of them were admitted to the intensive care unit for this reason. We found a negative correlation between the severity of the attacks and the weight and length in our study but with no statistical difference ($P = 0.120$).

Conclusion: we found no association between the asthma and the growth parameters in our survey.

Keywords: asthma, growth, weight, length.

Introduction

Asthma is a chronic inflammatory disease of the airways, characterized by recurrent episodes of airflow obstruction resulting from edema, bronchospasm, and increased mucus production. Commonly associated with seasonal allergies (allergic rhinitis) and eczema (atopic dermatitis), these three conditions form what is known as the atopic triad. Patients who have asthma may experience a range of respiratory symptoms, such as wheezing, shortness of breath, cough, and chest tightness. There is a wide range in the frequency and severity of the symptoms, but uncontrolled asthma and acute exacerbations can lead to respiratory failure and death [1].

The exact etiology of asthma remains unclear and appears to be multifactorial. Both genetic and environmental factors seem to contribute. Positive family history is a risk factor for asthma but is neither necessary nor sufficient for the development of the disease. Multiple environmental exposures, both prenatal and during childhood, are associated with the development of asthma. One of the most well-studied risk factors during the prenatal period is maternal smoking, which does appear to increase the risk of wheezing in childhood and likely increases risk for the development of asthma. Other proposed prenatal risk factors include maternal diet and nutrition, stress, use of antibiotics, and delivery via Cesarean section, though studies regarding these have been less conclusive [2].

It is generally acknowledged that asthma may have an effect on children's growth independent of any treatment they may be receiving. The many studies showing this have been reviewed recently by Russell in this journal.¹ In summary, children with moderate to severe asthma may have a characteristic pattern of slowing of prepubertal growth, delayed puberty, and a late pubertal growth spurt, with catch up to an adult height within the expected target range. It is because of this effect that

difficulties can arise in trying to separate the effects of asthma from the effects of any treatment in studies of growth in children with asthma [3,4].

There is little doubt that oral corticosteroids such as prednisolone can have a detrimental effect on growth. Martin *et al*,² in a prospective survey over 14 years, showed that children who had received oral steroids were significantly shorter than either asthmatic children who had not received steroids or non-asthmatic controls. However, this difference in height was only seen at age 14 years, and no difference was apparent by 21 years, indicating that the main effect of oral corticosteroids was to cause growth delay and affect the timing of puberty [5].

Aim of study

To investigate the effect of asthma on growth in children under 5 years old in Diyala governorate, Iraq.

Subject and methods

Type of study: cross sectional study on the asthmatic patients in Al-batool teaching hospital in the period from July 2022 to January 2023. A questionnaire of personal information was prepared for this purpose, The questions include the data of patients and ages, genders, weight, the existence of other comorbidities, the birth order, socioeconomic state, etc. all of them were on steroid therapy. we collected the data by direct face to face interview with the mothers. the privacy of the patients identities was preserved. The diagnosis was done by specialized pediatricians and the Spirometry test.

Weight: we used electronic balance to measure their weight in grams.

Length : we calculated the length by using tape measure.

The other questions in our questionnaire were answered directly by mothers and they were as the following:

- Other respiratory illnesses.
- Severity of the asthmatic episode
- Any hospital admission.
- Any other anomalies.
- Mode of feeding
- ICU admission
- Socioeconomic state
- Birth weight
- History of maternal smoking

All data were statistically analyzed depending on SPSS (Statistical Package for Social Science) version 18 (2009). Chi-square was used to compare between the variable in this study. Statistical results were considered significant when being under or equal to the 0.05.

Results

70 asthmatic patients were enrolled in this study. 54.3% of them were males and 46.7% were females. Their mean age was 29.12 months and their age groups are demonstrated in table 1.

Table 1. age groups

Age groups	Frequency	Percent
Up to 6 months old	7	10.0
6-12 months	9	12.9
12-36 months	32	45.7
36-60 months	22	31.4
Total	70	100.0

The severity of the episodes is demonstrated in table 2.

Table 2. severity

Severity	Frequency	Percent
Moderate	18	25.7
Severe	52	74.3
Total	70	100.0

9 (13%) of them had coexistent systemic diseases (6 Pneumonia, 2 Congenital heart disease and only one case of hypothyroidism).

Only 3 of them (4%) had low birth weight and the others had normal birth weight with more than 2500 grams.

The onset of the disease is demonstrated in table 3.

Table 3. onset of asthma

Onset	Frequency	Percent
After birth	34	48.6
During the first 6 months	22	31.4
During the first year	13	18.6
During the first 5 years	1	1.4
Total	70	100.0

Their mean weight was 12.68 kg, there was a negative correlation but with no statistical significance between the severity of asthma and the weight. their mean length was 84.8 cm. we found a significant difference between the severity of asthma and the length which they have strong negative correlation ($P < 0.05$). 37% of them had history of decrease weight compared to other normal children, 14.3% of them complained from malnutrition and 17% of them had slow growth in length compared to other normal children. 94% of them had previous hospital admission due to asthma attacks and 31.4% of them were admitted to the intensive care unit for this reason.

Their mode of feeding is demonstrated in table 4.

Table 4. mode of feeding

Mode	Frequency	Percent
Breastfeeding	3	4.3
Bottle feeding	33	47.1
Mixed feeding	6	8.6
Solid Food	28	40.0
Total	70	100.0

Severe attacks were common among the bottlefed children as in the following table but with no significant difference.

Table 5. severity and mode of feeding

Mode of feeding	Severity of Asthma attacks		Total	P value
	Moderate	Severe		
Breastfeeding	1	2	3	0.113
Bottle feeding	6	27	33	
Mixed feeding	0	6	6	
Solid Food	11	17	28	
Total	18	52	70	

The socioeconomic state is demonstrated in table 5.

Table 5. socioeconomic state

State	Frequency	Percent
Poor	1	1.4
Middle	44	62.9
Good	25	35.7
Total	70	100.0

Discussion

Longer term studies assess growth for more than 24 months and up to adulthood. There is a single randomised controlled study [6], and 2 longitudinal observational studies [7,8]. The landmark Childhood Asthma Management Program Research Group (CAMP) is unique in its 4–6 year period of follow up, showing that the effects of ICS on growth are relatively short lived. It was designed to measure the effects of regular inhaled anti-inflammatory agents on lung growth, with the primary end point being the change in forced.

There are no randomised controlled studies of asthma impact into childhood growth, and three small retrospective studies have given slightly contradictory results. Both Balfour-Lynn [9] and Silverstein et al [10] reported no differences in attained height between asthmatics in childhood and non-asthmatics. In contrast Van Bever et al [11] reported that, those who received ICS had significantly lower adult height compared to their predicted adult height based on mid parental height.

Children with obesity are at increased risk for developing asthma, which is already one of the most common chronic diseases among children. The cause underlying obesity's impact on asthma risk is unknown. Commonly cited potential etiologies include airway smooth muscle dysfunction from thoracic restriction, obesity-related circulating inflammation priming the lung, and obesity-related comorbidities mediating asthma symptom development. Each of these theories does not fit precisely with all of the data that have accumulated over the last decade [12].

In our study we negative correlation between weight and the attacks of asthma but with no statistical difference which is consistent with the findings of Doull et al [13].

Since the late 1950s, attention has been drawn to growth impairment related to maintenance systemic corticosteroids, but short stature had been observed in children with severe asthma before starting corticosteroid therapy [14]. These data support the earliest observation that asthma *per se* could adversely impact growth. In the early 1970s, the introduction of inhaled corticosteroids (ICS) revolutionized the treatment of asthma. ICS are currently the most effective anti-inflammatory medications for the treatment of asthma in adults and children, and will probably remain so for the foreseeable future. Although ICS are generally considered safe and highly effective treatment for children with asthma, the potential systemic adverse effects related to regular use of these drugs, especially the effects on growth, have drawn considerable concerns from healthcare providers and parents [15].

The poor socioeconomic state is associated with increased risk of severe attacks but with no statistical significant which is consistent with findings of Miller et al [16].

We found increased risk of experiencing severe attacks among bottle fed infant but with no significant difference and this is consistent with the findings of Bener et al [17].

The main limitations in our study were the lack of certainty in conducting information from the mothers and the size of the sample.

Conclusion

We found no association between the asthma and the normal growth of the asthmatic children. We recommend conducting more studies about this topic and about the impact of asthmatic drugs on growth parameters.

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