# ASSESSMENT OF THE ADVERSE EFFECTS OF LOW DOSES INHALED CORTICOSTEROIDS IN ASTHMATIC CHILDREN

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***Keywords:*** *asthma, inhaled corticosteroids, anthropometry*

***Abstract:*** *The way in which inhaled corticosteroids influence the growth and the development of the children with asthma is relatively little studied, the results being often contradictory. The study was conducted on two hundred subjects with one hundred children with asthma treated with inhaled corticosteroids and one hundred represented the control group. They were divided into five categories of age; we performed measurements every six months for a period of two years. The results showed a significant influence of the inhaled corticosteroid therapy on the growth rate of the asthmatic patients.*

***Cuvinte cheie:*** *astm bronşic, corticosteroizi inhalatori, antropometrie*

***Rezumat:*** *Felul în care corticosteroizii inhalatori influenţează creşterea şi dezvoltarea copiiilor cu astm bronşic este relativ puţin studiată, de multe ori rezultatele fiind contradictorii. Studiul s-a efectuat pe un număr de două sute de subiecţi, o sută fiind copii cu astm bronşic sub tratament cu corticosteroizi inhalatori şi o sută fiind reprezentaţi de lotul martor. Aceştia au fost împărţiţi în cinci categori de vârstă, am efectuat măsurători la interval de şase luni pe o perioadă de doi ani. Rezultatele nu au evidenţiat o influenţă semnificativă a corticoterapiei inhalatorii asupra ratei creşterii la pacienţii astmatici.*

## INTRODUCTION

The treatment of the asthmatic children should bring satisfactions, both for the asthmatic child, as well as for the parents and the doctor. For the children and caregivers, the primary objective is the reduction of the disease symptoms and exacerbations. Another important goal is to decrease the adverse effects of asthma and of the medicinal preparations used to treat asthma. The physician's preoccupation is to reduce the concerns of the patients and of their parents regarding the disease and its treatment, trying to ensure a longer period of time without the occurrence of the negative effects of the disease and treatment.(5)

In practice, we use inhaled corticosteroids (ICS) in small doses that have an effect comparable to moderate doses (21) demonstrated in our study with patients using these low-dose ICS (Becotide 200-400mcg/zi or Fluticasone 100-300mcg/day).

Under current guidelines, ICS are the treatment of first choice preferred on long term for the asthmatic children in all age groups (9), representing the "central axis" of the treatment (18.2), ICS being the "gold standard" in the treatment of inflammatory asthma. ICS are the first line therapy for the patients with persistent asthma; they represent the only currently available therapy suppressing inflammation in asthmatic airways inhibiting almost every aspect of the inflammatory process in asthma. ICS are effective in most patients with asthma, regardless of age or disease severity (1), they are indispensable in the treatment of asthma.(8)

Many clinicians suggest using small doses of ICS as to decrease the chances of facing their adverse effects (13), other researchers indicate where ICS doses are not sufficient to also use beta2 agonists.(12) There are opinions which emphasize that the use of ICS in acute asthma crises has a lower effect to the administration of systemic corticosteroids.(6)

ICS offer a wide range of inflammatory activity and have consistently shown that they represent the most effective medicine to control asthma in childhood.(14,20,15) Inhaled cortisone preparations are administered with the help of different types of inhalation devices, preferring those with hydrofloroalkan, affecting less the ozone layer of the atmosphere.

Like most of the corticosteroids, the inhaled corticosteroids can have adverse effects on the long-term treatments, such as decreased growth and development (4), on which we focused our study. Regarding the adverse effects of ICS, opinions are divided, some studies show that ICS decrease the growth rate in the children with asthma (10), but on the contrary, others believe that ICS do not have a negative influence on growth.(19)

## PURPOSE

The study aimed at studying how inhaled corticosteroids in asthmatic children influence their development.

## METHODS

We took into account a number of two hundred subjects where one hundred children with mild or moderate asthma undergoing treatment with low doses of ICS, and one hundred represented the control group, children not suffering from any chronic disease and did not show growth disorders. The subjects were divided into five age groups: 5 years old - 8 years old, between eight years old to 10 years old, 10 years old to 13 years old, from 13 years old to 16 years old, and between 16 years old to 19 years old. For each age group, both control group and those with asthma, measurements were performed every six months for two years of the following anthropometric

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parameters: the circumference of the skull, chest, arm, thigh and calf.

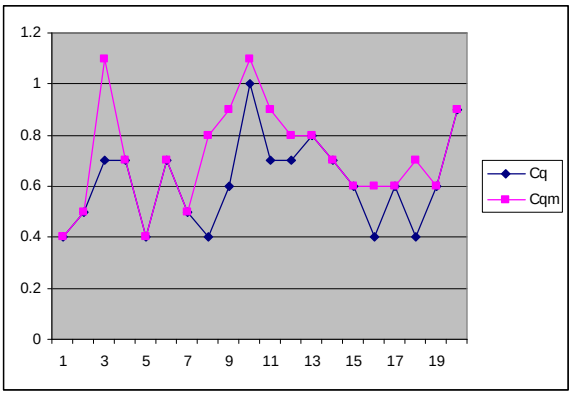
## RESULTS AND DISCUSSIONS

*Skull circumference*:

At the age group of 5 years old - 8 years old, there was a minimal decrease in growth by about 0.1 cm after the first year of treatment, after the second year, the difference being less than 0.2 cm, where p was of 0.96.

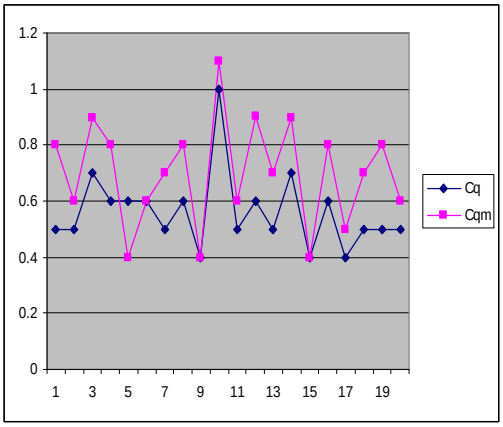
At the age group of 8 years old - 10 years old, there was a minimal decrease in growth by about 0.1 cm after the first year of treatment, after the second year, the difference being less than 0.3 cm, where p was of 0.94.

**Figure no. 1. Comparison of skull circumference growth values (age group 8 years old - 10 years old) Cq - study group, Cqm - control group**




At the age group of 10 years old - 13 years old, there was a minimal decrease in growth by about 0.1 cm after the first year of treatment, after the second year, the difference being less than 0.4 cm, where p was of 0.91.

**Figure no. 2. Comparison of skull circumference growth values (age group 10 years old - 13 years old). Cq - study group, Cqm - control group**




At the age group of 13 years old - 16 years old, there was a minimal decrease in growth by about 0.1 cm after the first year of treatment, after the second year, the difference being less than 0.2 cm, where p was of 0.96.

At the age group of 16 years old - 19 years old, there was a minimal decrease in growth by about 0.2 cm after the first year of treatment, after the second year, the difference being smaller than 0.2 cm, where p was of 0.93.

*Chest circumference*:

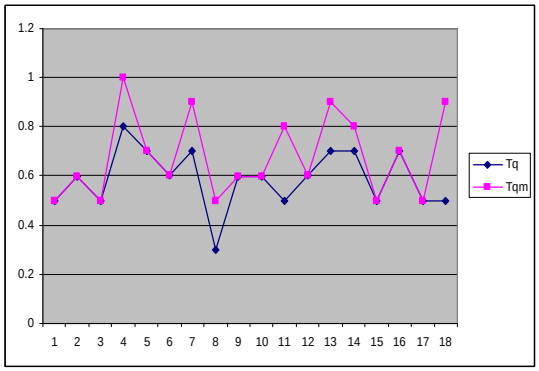
At the age group of 5 years old - 8 years old, there was a minimal decrease in growth by about 0.03 cm after the first year of treatment, after the second year, the difference being less than 0.04 cm, where p was of 0.91.

At the age group of 8 years old - 10 years old, there was a minimal decrease in growth by about 0.01 cm after the first year of treatment, after the second year, the difference being less than 0.01 cm, where p was of 0.97.

At the age group of 10 years old - 13 years old, there was a minimal decrease in growth by about 0.03 cm after the first year of treatment, after the second year, the difference being less than 0.02 cm, where p was of 0.94.

At the age group of 13 years old - 16 years old, there was a minimal decrease in growth by about 0.01 cm after the first year of treatment, after the second year, the difference being less than 0.02 cm, where p was of 0.96.

**Figure no. 3 Comparison of chest circumference growth values (age group 13 years old - 16 years old). Tq - study group, Tqm - control group**

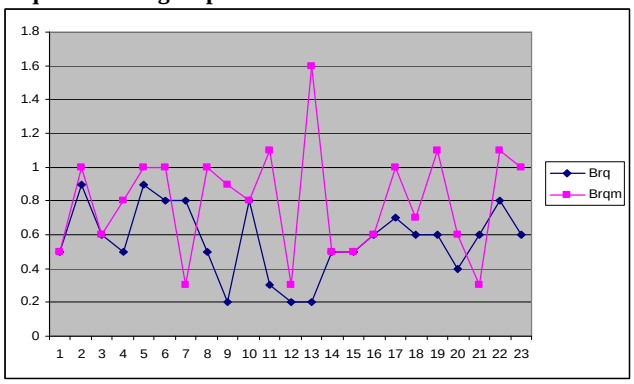



At the age group of 16 years old - 19 years old, there was a minimal decrease in growth by about 0.02 cm after the first year of treatment, after the second year, the difference being less than 0.01 cm, where p was of 0.96.

*Arm circumference:*

At the age group of 5 years old - 8 years old, there was a minimal decrease in growth by about 0.2 mm after the first year of treatment, after the second year, the difference being less than 0.3 mm, where p was of 0.93.

**Figure no. 4 Comparison arm circumference growth values (age group 5 years old - 8 years old). Brq - study group, Brqm - control group**




At the age group of 8 years old - 10 years old, there was a minimal decrease in growth by about 0.1 mm after the first year of treatment, after the second year, the difference being less than 0.4 mm, where p was 0.93.

At the age group of 10 years - 13 years old, there was a minimal decrease in growth by about 0.1 mm after the first year of treatment, after the second year, the difference being less than 0.4 mm, where p was 0.92.

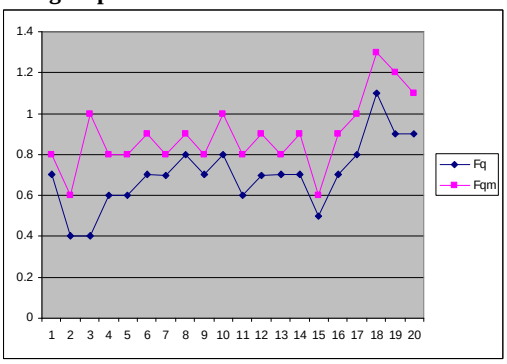
At the age group of 13 years old - 16 years old, there was a minimal decrease in growth by about 0.2 mm after the first year of treatment, after the second year, the difference being less than 0.3 mm, where p was 0.92.

At the age group of 16 years old - 19 years old, there was a minimal decrease in growth by about 0.3 mm after the first year of treatment, after the second yeart, the difference being less than 0.6 mm, where p was 0.85

*Thigh circumference*:

At the age group of 5 years old - 8 years old, there was a minimal decrease in growth by about 0.1 cm after the first year of treatment, after the second year, the difference being less than 0.04 cm, where p was of 0.87. At the age group of 8 years- 10 years old, there was a minimal decrease in growth by about 0.01 cm after the first year of treatment, after the second year, the difference being less than 0.01 cm, where p was of 0.98. At the age group of 10 years old - 13 years old, there was a minimal decrease in growth by about 0.04 cm after the first year, after the second the difference is less than 0.06 cm, where p was of 0.84.

**Figure no. 5 Comparing thigh circumference growth values (age group 10 years old - 13 years old). Fq - study group, Fqm - control group**

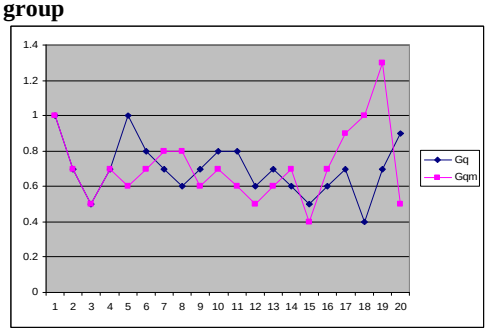



At the age group of 13 years old - 16 years old, there was a minimal decrease in growth by about 0.04 cm after the first year of treatment, after the second year, the difference being less than 0.05 cm, where p was of 0.89. At the age group of 16 years old - 19 years old, there was a minimal decrease in growth by about 0.03 cm after the first year, of treatment, after the second year, the difference being less than 0.04 cm, where p was of 0.88.

***Calf circumference***:

At the age group of 5 years old - 8 years old, as a result of examining the values obtained, there was a minimal decrease in growth by about 0.2 mm after the first year of treatment, after the second year, the difference being less than 0.2 mm where p was of 0,94.

**Figure no. 6 Comparing calf circumference growth values (age group 5 years old - 8 years old). Gq - study group, Gqm - control group**




At the age group of 8 years - 10 years old, after examining the values obtained, there was a minimal decrease in growth by about 0.2 mm after the first year of treatment, after the second year, the difference being less than 0.3 mm where p was 0.92.

At the age group of 10 years - 13 years old, after examining the values obtained, there was a minimal decrease in growth by about 0.1 mm after the first year of treatment, after the second year, the difference being less than 0.1 mm where p was 0.97.

At the age group of 13 years old - 16 years old, after examining the values obtained, there was a minimal decrease in growth by about 0.1 mm after the first year of treatment, after the second year, the difference being less than 0.4 mm where p was 0.92.

At the age group of 16 years old - 19 years old, after examining the values obtained, there was a minimal decrease in growth by about 0.3 mm after the first year of treatment, after the second year, the difference is less than 0.5 mm where p was 0.86.

## CONCLUSIONS

In the subjects treated with ICS compared with the control groups, the mean difference of cranial perimeter growth was approximately equal, with p higher than 0.91 Inhaled corticosteroids do not affect the growth of the skull circumference

Regarding chest circumference, the average difference in growth was significantly lower in the subjects treated with ICS compared with controls, with values up to 0.3 mm after one year and by 0.4 mm after two years of treatment, with p higher than 0, 91, being considered as statistically insignificant Inhaled corticosteroids do not affect chest circumference growth

Regarding arm circumference, there was a slight growth impairment in the subjects treated with ICS, compared with the control group, a decrease by maximum 0.2 mm after one year of treatment and by 0.6 mm after two years of treatment with p higher than 0.85. Inhaled corticosteroids do not affect the growth of the arm circumference

As for the thigh circumference, the average growth difference was lower in the subjects treated with ICS, compared with the control group, with values of maximum 1 mm after one year of treatment and of 0.6 mm after two years of treatment, with p higher than 0, 84. Inhaled corticosteroids cause a statistically insignificant decrease in thigh circumference

In the case of calf circumference, the average difference in growth was higher in the control subjects than in the group treated with inhaled glucocorticoids, with maximum values of 0.3 mm after one year and of 0.5 mm after two years of treatment, with p higher than 0.86. Inhaled corticosteroids do not affect calf circumference growth.

The growth of the subjects treated with inhaled corticosteroids in low doses over two years is not significantly affected. The growth rate of the subjects included in the study was similar to the literature data, showing a stronger growth and development during school age (10-16 years old).

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