

DOES INHALED CORTICOSTEROIDS INFLUENCE THE GROWTH RATE IN CHILDREN WITH ASTHMA?

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Abstract: The influence of inhaled corticosteroids on growth and development in children with asthma is relatively less studied and the results are often contradictory. We considered 200 subjects, 100 were children with asthma treated with inhaled corticosteroids and 100 are represented by the control group, children who did not have any chronic disease. Subjects were divided into five age categories: under 8 years 8 to 10 years, from 11 to 13 years, between 14 and 16 and between 17 and 19. We performed measurements every six months the following anthropometric parameters: height, bust length, chest circumference, arm and skull. The results revealed no significant influence on growth rate in patients with asthma who were treated with inhaled corticosteroids.

Cuvinte cheie: astm bronșic, corticosteroizi inhalatori

Rezumat: Influența corticosteroizilor inhalatori asupra creșterii și dezvoltării la copiii cu astm bronșic este relativ puțin studiată, iar rezultatele sunt de multe ori contradictorii. Am luat în calcul 200 de subiecți, 100 fiind copii cu astm bronșic sub tratament cu corticosteroizi inhalatori, iar 100 fiind reprezentanți de lotul martor, copii care nu sufereau de nici o boală cronică. Subiecții au fost împărțiți în cinci categorii de vârstă : sub 8 ani, între 8 și 10 ani, între 11 și 13 ani, între 14 și 16 ani și între 17 și 19 ani. Am efectuat măsurători la interval de 6 luni la nivelul următorilor parametri antropometrici: înălțimii, lungimii bustului, circumferința toracelui, a brațului și craniului. Rezultatele obținute nu au evidențiat o influență semnificativă asupra ratei creșterii, la pacienții cu astm bronșic care au fost tratați cu corticosteroizi inhalatori.

INTRODUCTION

Asthma is considered a chronic inflammatory disease of the airways due to the involvement of many cells (particularly eosinophils, lymphocytes, macrophages, mast cells, neutrophils, epithelial cells, smooth muscle fibers), cytokines and mediators. In susceptible individuals, inflammation causes recurrent episodes of dyspnea with expiratory wheezing, coughing (particularly at night or morning, early).

Episodes are frequently associated with variable airway obstruction often resolves spontaneously or following treatment.

Inflammation is responsible for increased airway responsiveness background and / or consecutive to various stimuli.

- Inhaled corticosteroids once a day instead of 2 times a day seem to have a lower impact on growth, but a short-term clinical study does not allow us to generalize it, in 24 children in the pre-puberty with form mild asthma, it was administered budesonide 800 mcg / daily, compared with 400 mcg / 2 times daily for 4 weeks, lower leg growth rate and "turn over" the collagen was significantly lower in boys who received doses of 400 mcg / 2 times per day [11]
- Fluticasone may reduce the growth rate of less than beclomethasone, as demonstrated in a study of 343 children over a period of 12 months [12].

THE AIM OF THE STUDY

The purpose of the study is conducted to investigate how the use of inhaled corticosteroids in children with asthma affects their growth rate.

MATERIAL AND METHOD

Our study considered 200 subjects, 100 were children with asthma treated with inhaled corticosteroids (fluticasone propionate 200 mcg per day), and 100 are represented by control group, children who did not have any chronic disease. Subjects were divided into five age categories: under 8 years 8 to 10 year, from 11 to 13 years, between 14 and 16 and between 17 and 19. For each age group both witnesses and those with asthma have been conducted every six months measurements of anthropometric parameters following: height, bust, chest circumference, thigh, arm, and skull. Measurements were made over a period of two years.

Criteria for inclusion in the two groups were:

- Children aged 2-19 years
- Children who are out with asthma treated with inhaled corticosteroids
- Children who are not registered with chronic heart, lung, kidney or abnormal hematopoiesis

Groups were homogeneous, no significant differences regarding the distribution by sex and age groups.

RESULTS AND DISCUSSIONS

1. Circumference chest:

Lot *cases* under 8 years of measured values observed an average difference of 0.37 mm and 0.76 mm in the first year in 2 years.

The group 11-13 years: measurements indicate an average growth difference of 0.35 mm at 1 year and 2 years of 0.66 mm.

The group 14-16 years: the measured values of the

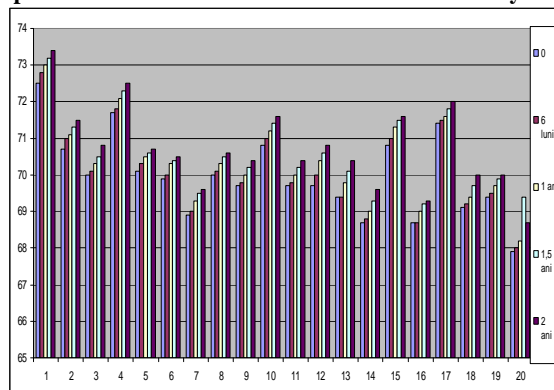
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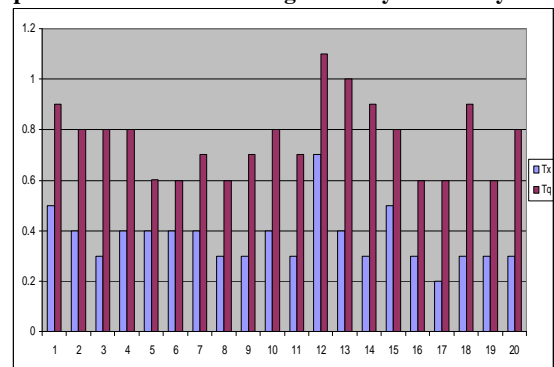
difference observed an average increase of 0.26 mm in year 1 and year 2 of 0.60 mm

The group 17-19 years: the measured values of the difference observed an average increase of 0.34 mm after one year and after 2 years of 0.77 mm.

Graphic no. 1.1 chest circumference values under 8 years



Graphic no. 1.2 Differences in growth 1 year and 2 years



The Control group under 8 years can be seen in measurements obtained an average difference of growth in the first year of 0.43 mm and 0.82 mm in the II year.

The group 9-10 years shows an average of values obtained in a growing difference of 0.36 mm and 0.79 mm in year 2.

The group 11-13 years: the average difference in growth is observed after the first year of 0.45 mm and 0.76 mm after 2 years.

The group 14-16 years is shown in this table that the average difference is 0.35 mm increase in the first year and 0.68mm in the second.

The group 17-19 years: of these values shows that the average difference is 0.41 mm to increase the first year and 0.84 mm in year 2.

2. The skull circumference :

Lot cases under 8 years age group: the average difference observed an average measurements of 0.34 mm growth after the first year and 0.70 mm after year 2.

The group 9-10 years: data obtained lead us to an average growth difference after the first year is 0.30 mm and 0.61 mm after 2nd year.

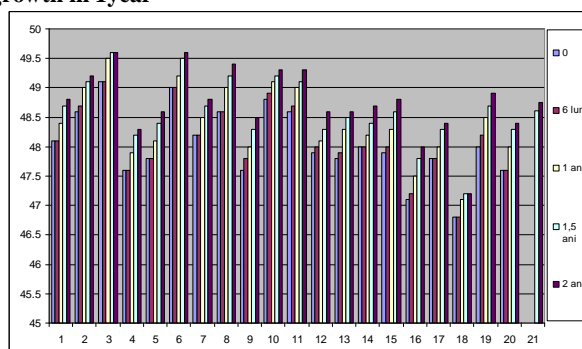
The group 11-13 years: the data obtained shows a mean difference of 0.30 mm growth after the first year and 0.55 mm after the II.

The group 14-16 years: the values obtained can be seen that the average difference in growth after the first year is 0.20 mm and 0.53 mm after 2nd year.

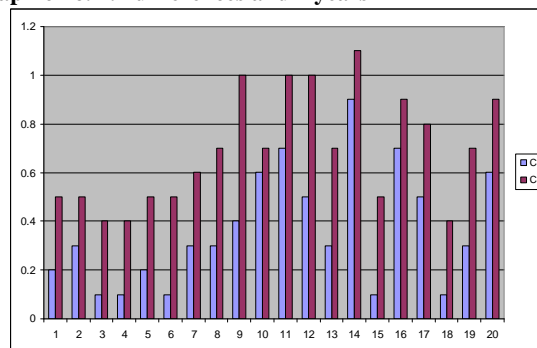
The group 17-19 years: the values obtained can be

seen an average increase of 0.36 mm gap after the first year and 0.69 mm after year 2.

Graphic no. 2.1 skull circumference values under 8 years of growth in 1 year



Graphic no. 2.2 differences and 2 years



The control group under 8 years age group: the values obtained shows that the average difference in growth after the first year is 0.37 mm, and after the second year of 0.75 mm.

The group of 9-10 years: the values obtained can be seen that the average difference in growth after the first year of 0.38 mm and 0.71 mm after 2nd year.

The group of 11-13 years of these values shows that the average difference in growth after the first year is 0.39 mm and 0.70 mm after 2nd year.

The group of 14-16 years shows the average difference in these values after the first year growth of 0.23 mm and 0.56 mm after 2nd year.

The group 17-19 years: the values obtained show a mean difference of 0.43 mm growth after the first year and 0.75 mm after year 2.

3. Bust lenght:

Cases in the group under 8 years age group: measured values lead to an increase in the average difference of 0.25 mm after the first year and after the II year of 0.59 mm.

The group 9-10 years: measured values lead to an average growth difference after the first year was 0.23 mm and 0.54 mm after 2nd year.

The group 11-13 years: measured values lead to an average growth difference after the first year was 0.23 mm and 0.57 mm after 2nd year.

The group 14-16 years: measured values lead to an increase in the average difference of 0.27 mm in the first year and 0.58 mm after year 2.

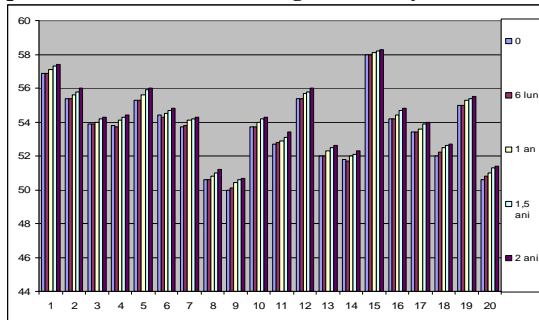
The group 17-19 years: measured values lead to an average growth difference after the first year of 0.26 mm and 0.58 mm after year 2.

The control group under 8 years age group: the measured values leads to an average difference of 0.26 mm after

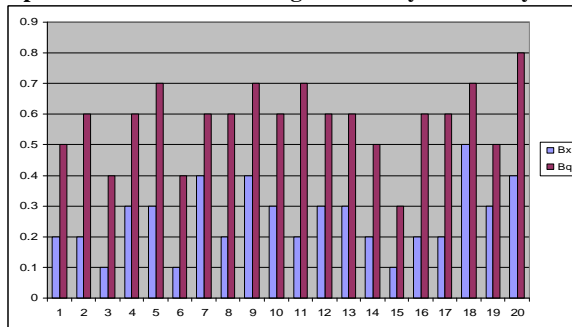
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the first year and after year 2 of 0.61 mm.

Graphic no. 3.1 Values bust length under 8years



Graphic no. 3.2 differences of growth in 1year and 2 years



The group 9-10 years are obtained from measurements made an average difference after the first year increase of 0.25 mm and 0.57 mm after year 2.

The group 11-13 years is an average derived from measurements of the difference in growth after the first year of 0.25 mm and 0.62 mm after year 2.

The group 14-16 years is an average derived from measurements of the difference in growth after the first year of 0.29 mm and 0.60 mm in year 2.

The group 17-19 years is an average derived from measurements of the difference in growth after the first year of 0.29 mm and after the Second of 0.61 mm.

4. The arm circumference :

Group cases under 8 years age :the values obtained shows that the difference in growth after the first year was 0.32 mm and 0.59 mm after 2nd year

The group 9-10 years: the values obtained shows that the difference in growth after the first year was 0.40 mm and 0.74 mm after 2nd year.

The group 11-13 years: the values obtained is observed that the average difference in growth after the first year was 0.38 mm and after the II year of 0.67 mm.

The group 14-16 years: the values obtained is observed that the average difference in growth after the first year was 0.40 mm and after the Second year of 0.68 mm.

The group 17-19 years: the values obtained is observed that the average difference in growth in the first year was 0.32 mm and 0.62 mm in year 2.

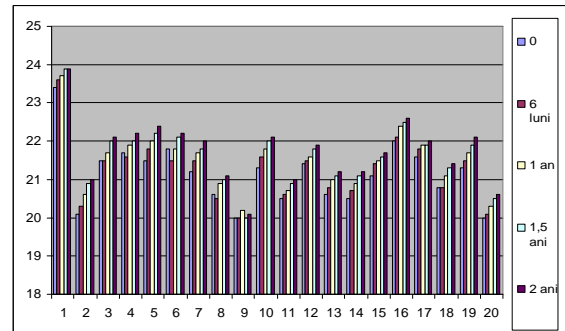
The control group under 8 years age group: the values obtained can be seen that the average difference in growth after the first year was of 0.39 mm, and after year 2 of 0.67 mm.

The group 9-10 years: the values obtained shows that the average difference in growth after the first year was 0.45 mm and 0.85 mm in year 2.

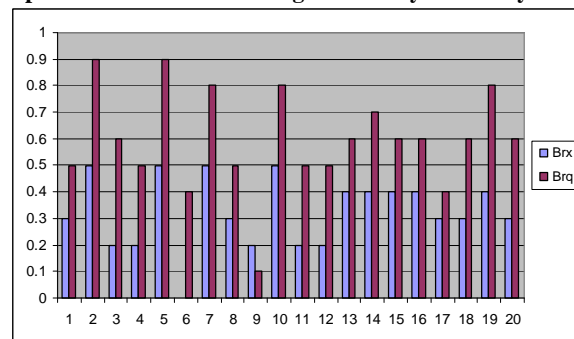
The group 11-13 years: the measured values shows that the average difference in growth in the first year was 0.41 mm and 0.71 mm in year 2.

The group 14-16 years: measured values lead to an average growth difference after the first year was 0.43 mm and 0.72 mm in year 2.

Graphic no. 4.1 Arm circumference under 8 years



Graphic no. 4.2 differences of growth in 1year and 2years



The group 17-19 years: measured values lead to an average growth difference after the first year was 0.36 mm and 0.69 mm after 2nd year..

5.Height:

Control group under 8 years: from the measurements shows a mean difference of 0.70 mm and 1.32 mm in the first year in 2 years.

The group 9-10 years: from measurements made there is an increase in the average difference of 0.45 mm and after the II 1.07 mm.

The group 11-13 years: from the measurements shows a mean difference in growth from 1 year to 2 years of 0.77 mm and 1.16 mm.

The group 14-16 years: measurements showed an average increase in a difference of 0.57 mm and 1.07 mm in year 2.

The group 17-19 years: measurements showed an average of 0.66 mm after one year and after two years of 1.36 mm.

Lot cases under 8 years of measurements observed a mean difference in first year growth of 0.60 mm and 1.29 mm in the II year.

The group 9-10 years: the measured values shows an average growth difference of 0.33 mm in year 1 and year 2 of 1.02 mm.

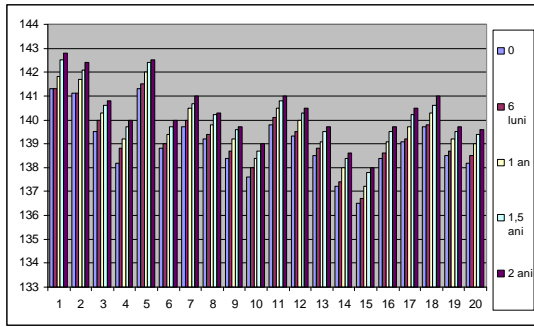
The group 11-13 years: the measurements showed a mean difference in growth after the first year of 0.55 mm and 0.99 mm after 2 years.

The group 14-16 years of measurements showed a mean increase of 0.44 mm difference in the first year and 1.03 mm in the second.

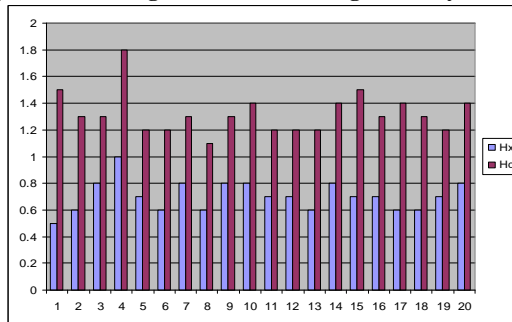
The group 17-19 years: the measured values show that the average difference is 0.56 mm to increase the first year and 1.33 mm in year 2.

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Graphic no. 5.1 Values under 8 years



Graphic no. 5.2 height differences and growth 1 year 2 years



CONCLUSIONS

1. We can say that the average difference in growth of the subjects under study leads to a result that confirms that the development and growth rate in children treated with inhaled corticosteroids is not influenced by them.
2. Chest circumference variation of 0.04 mm to 0.10 mm in the first year and 0.06 mm to 0.10 mm after the second year of treatment.
3. The circumference of the skull shows a variation between 0.03 mm and 0.09 mm after the first year and 0.03 mm to 0.15 mm after year two.
4. Bust length variation of between 0.01 mm and 0.03 mm after the first year and 0.02 mm to 0.05 mm after the second year of treatment.
5. Arm circumference variation of between 0.03 mm and 0.07 mm after the first year and 0.04 mm to 0.11 mm after year two.
6. The height variation is found between 0.10 mm and 0.22 mm in the first year and 0.03 mm and 0.19 mm after year two.
7. We can say that the children of the group with asthma treated with inhaled corticosteroids and those in the control group difference not exceeding 0.15 mm.
8. We can say that the average difference in growth of the subjects under study leads to a result that confirms that the development and growth rate in children treated with inhaled corticosteroids is not influenced by them.

BIBLIOGRAPHY

1. Mihai Leonida Neamțu, Astmul bronșic la copil, Sibiu 2003.
2. Guidelines for the Diagnosis and Management of Asthma, Expert Panel Report, National heart, lung, and blood institute NIH Publications, No. 97- 4051 July 1997
3. Barnes P., Drazen J., Rennard S., Neil T. - Asthma and COPD Basic mechanisms and Clinical Management, Academic Press, Elsevier Science Ltd., London, 2002
4. Guidelines for the Diagnosis and Management of Asthma,

U.S Department of Health and Human Services, 2007

5. Kemp J.P., Osur S., Shrewsbury S.B., Herje N.E., Duke S.P., Harding S.M., Faulkner K., Crim C.C. - Potential effects of fluticasone propionate on bone mineral density in patients with asthma: a 2-year randomized, double-blind, placebo-controlled trial., Mayo Clin.Proc. 2004 Apr; 79 (4): 458
6. Stephen P., Peters - Safety of inhaled corticosteroids in the treatment of persistent asthma, J Natl Med Assoc. 2006 June; 98(6): 851-861
7. Bacharier L.B., Raissy H., Wilson L., McWilliams B, Strunk R.C, Kelly H.W. - Long-Term Effect of Budesonide on Hypothalamic-Pituitary-Adrenal Axis Function in Children With Mild to Moderate Asthma, Pediatrics Vol. 113 No. 6 June 2004, pp. 1693-1699
8. Schlienger R.G, Jick S, Meier C.R. - Inhaled Corticosteroids and the Risk of Fractures in Children and Adolescents, Pediatrics Vol. 114 No. 2 August 2004, pp. 469-473
9. Roux C., Kolta S., Desfougères J.L., Minini P., Bidat E. - Long-Term Safety of Fluticasone Propionate and Nedocromil Sodium on Bone in Children With Asthma, Pediatrics 2003 Jun; 111 (6): E 706
10. Sharek P.J., Bergman D.A. - The Effect of Inhaled Steroids on the Linear Growth of Children With Asthma: A Meta-analysis, Pediatrics 2000 Jul, 106(1):e8
11. Heuck C., Wolthers O.D., Kollerup G., Hansen M., Teisner B. - Adverse effects of inhaled budesonide (800 µg) on growth and collagen turnover in children with asthma: A double-blind comparison of once-daily versus twice-daily administration, J.Pediatr 1998 Nov, 133: 608
12. Benedictis F.M, Teper A., Green R.J., Boner L., Williams L., Medley H. - Effects of 2 Inhaled Corticosteroids on Growth, Arch Pediatr Adolesc Med 2001, Nov; 155 (11): 1248
13. Garbe E., Suissa S., LeLorier J. - Association of inhaled corticosteroid use with cataract extraction in elderly patients, JAMA 1998 Aug 12; 280(6): 539-43.
14. Samraj G.P., Kuritzky L. - Inhaled corticosteroids: 2. Systemic toxicity, Hosp Pract (Minneapolis). 2000 Jun 15; 35 (6): 35-8.
15. Mihai Leonida Neamțu, Compendiu de Pneumologie Pediatrică, Ed. ULB Sibiu, 2005.
16. Eugen Ciofu, Carmen Ciofu, Esențialul în Pediatrie, Ed. Med. Amaltea București, 1998.
17. Brand P.L.P. Inhaled corticosteroids reduce growth. Or do they? Erj 2001 no 2 287-294.