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Hypothalamic Pituitary Adrenal Axis in Asthmatic Children

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Abstract

Background: Bronchial asthma is an important global health problem which affects all age groups, and its prevalence is increasing in many countries, especially among children.

Aim of Study: The aim of this study is to define hypothalamic pituitary adrenal axis suppression (HPAS) in asthmatic children.

Subjects and Methods: This study was a cross-sectional study has in pediatric chest and outpatient clinics at Children's Hospital, Ain Shams University, Cairo, Egypt (1 year duration) during the period from November 2022 to November 2023. This study was carried out on 35 asthmatic pediatric patients aged from 3-10 years old with documented asthma diagnosis.

Results: The presenting respiratory symptoms for studied patients as 21 (60%) were presented by cough, 9 (25.7%) were presented bydyspnea, 25 (71.4%) were presented by wheezes and 14 (40%) were presented by exercise intolerance. Serum Cortisol (PM) level were with median 167.65 (110.84-247.97) with range (110.2-538.1).

Conclusion: Median serum Cortisol (PM) level was 167.65 with range (110.2-538.1).

Key Words: *Hypothalamic – Pituitary – Adrenal axis – Asthmatic children.*

Introduction

BRONCHIAL asthma is an important global health problem which affects all age groups, and its prevalence is increasing in many countries, especially among children. It is estimated to affect around 300 million people worldwide and is believed to be the most common chronic disease in children **[1].**

Asthma is a multifaceted disease marked by recurrent airway inflammation. A history of respiratory symptoms such as wheezing, shortness of breath, chest tightness, and cough that vary in severity and length over time characterizes this condition. Airway constriction can become permanent when paired with fluctuating expiratory airway inflammation **[2].**

Despite the fact that repeated wheezing is one of the most prevalent signs of asthma, not all children who wheeze are asthmatic, and only a tiny number of newborns who wheeze will acquire asthma later in life **[3].**

Asthma symptoms and airflow blockage are frequently reversible, either naturally or with therapy. Patients with asthma can have life-threatening episodes of flare-ups (exacerbations) **[4].**

Aim of the work:

The aim of this study is to define hypothalamic pituitary adrenal axis in asthmatic children.

Patients and Methods

This study was a cross-sectional study thatwas performed during the period from November 2022 to November 2023 at pediatrics chest and outpatient clinics at Children's Hospital, Ain Shams University through 1 year.

Study population:

This study was carried out on 35 patients in the age group of 3-10 years, diagnosed with bronchial asthma.

Selection criteria for cases:

Inclusion criteria: Patients with diagnosis of asthma.

Exclusion criteria: Patients were with any endocrinal disorders.

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Methods: All the patients at this study were subjected to:

1- Full medical history was recorded including:
- Demographic data:
- Name, age, sex, consanguinity and family history.

2- Clinical examination included:
A) General examination.
B) Local chest examination.

3- Laboratory investigation:
- Serum Cortisol (PM) level.

Results

Table (1): Demographic data and characteristics of the studied patients.

	Total No. = 35
Age (years):	
Mean ± SD	6.49±3.32
Range	3 – 10
Sex:	
Male	20 (57.1%)
Female	15 (42.9%)
Residency:	
Urban	25 (71.4%)
Rural	10 (28.6%)
Family history:	
No	13 (37.1%)
Yes	22 (62.9%)

This table shows that studied patients were 35 patients in the age group of (3-10) years with mean age in years 6.49±3.32. Male patients were 20 (57.1%) and female patients were 15 (42.9%). 25 (71.4%) were from Urban and 10 (28.6%) were from rural. 22 (62.9%) had positive family history.

Table (2): Presenting symptoms among studied patients.

	Total No. = 35
Presenting respiratory symptoms:	
Cough	21 (60%)
Dyspnea	9 (25.7%)
Wheezes	25 (71.4%)
Exercise intolerance	14 (40%)

This table shows the presenting respiratory symptoms for studied patients as 21 (60%) were presented by cough, 9 (25.7%) were presented by-dyspnea, 25 (71.4%) were presented by wheezes and 14 (40%) were presented by exercise intolerance.

Table (3): Laboratory investigation among the studied patients.

	Total No. = 35
Serum Cortisol (PM) level:	
Median (IQR)	167.65 (110.84 - 247.97)
Range	110.2 – 538.1

This table shows that median Serum Cortisol (PM) level was 167.65 (110.84-247.97) with range (110.2-538.1).

Discussion

The current study showed that the median age of the studied patients with bronchial asthma was 6.49±3.32 with range (3-10) years

A similar pattern was observed by a study conducted by Engelkes et al. **[5]** who revealed that the number of children with active symptoms of bronchial asthma was less in those aged 10-15 years than in those aged less than 6 years. As a higher asthma incidence rate found in young children.

However, the results of the current study came different from the results of the studies conducted by Zahran et al. **[6]** who found that in general bronchial asthma was more prevalent among children aged ≥5 years than children aged <5 years.

In the current study according to the sex distribution males were more than females as male patients were 20 (57.1%) and female patients were 15 (42.9%).

This finding was in concordance with study conducted by Zahran et al. **[6]** which revealed that boys have a higher risk of asthma compared to girls in early childhood.

A different finding was revealed by Mallol et al., **[7]** who observed that the incidence of asthma was higher in girls than in boys.

In the current study, the prevalence of asthma in children was lower in rural areas compared with children in the urban area as 25 (71.4%) children were from urban areas and 10 (28.6%) were from rural areas.

These results were in agreement with other study conducted by Zhu et al., 2015 **[8]** who revealed that the prevalence of asthma in children was lower in rural areas compared with children in the urban areas.

A different finding was revealed by Malik et al., **[9]** who observed that there was higher prevalence in the rural region compared to the urban.

In the current study, family history was present in 22 patients (62.9%).

Our results parallel to study conducted by Depner et al. *[10]* who suggested that family history of asthma has an important role in asthma prevalence.

Moreover, it is estimated that, asthma is a worldwide disorder, In Northern Sweden, data from recent studies indicated that one of major risk factors for the development of asthma was the positive family history of bronchial asthma *[11]*.

Our finding was in contrast with a study conducted by Stick et al. *[12]* who claimed that no evidence was available on the effects of a family history of asthma on fetal lung development and future asthma prediction.

In the present study, it was found that about 21 (60%) were presented by cough, 9 (25.7%) were presented by dyspnea, 25 (71.4%) were presented by wheezes and 14 (40%) were presented byexercise intolerance.

A different finding was revealed by Kumar et al. *[13]* who revealed that the most common symptom at the time of presentation was breath lessness (94.5%) followed by cough in about 59.8% of patients, (20.1%) of chest tightness, and (30.7%) wheezes, while, Ghonem et al. *[14]* found that asthmatic presenting symptoms in children were cough 167 (92.2%), wheezy chest in 159 (87.8%), dyspnea in 147 (80.2%), and chest tightness 135 (74.5%).

In our study Serum Cortisol (PM) level were with median 167.65 (110.84-247.97) with range (110.2-538.1).

A different finding was revealed by Akurugu et al., *[15]* who found that serum cortisol (PM) were with median 235.65 (215.14-459.38) with range (231.92-617.4).

Conclusion:

In conclusion, asthmatic children can presenting by symptoms as 21 (60%) were presented by cough, 9 (25.7%) were presented by dyspnea, 25 (71.4%) were presented by wheezes and 14 (40%) were presented by exercise intolerance.

Serum Cortisol (PM) level was 167.65 (110.84 - 247.97) with range (110.2-538.1).

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تثبيط محور الغدة النخامية الغدة الكظرية عند الأطفال المصابين بالربو

الخلفية: يعد الربو القصبى مشكلة صحية عالمية مهمة تؤثر على جميع الفئات العمرية، ويتزايد انتشاره فى العديد من البلدان، وخاصة بين الأطفال. وتشير التقديرات إلى أنه يؤثر على حوالى ٣٠٠ مليون شخص فى جميع أنحاء العالم ويعتقد أنه المرض المزمن الأكثر شيوعاً بين الأطفال.

الهدف والأهداف: تهدف هذه الدراسة إلى تحديد تثبيط محور الغدة النخامية الكظرية عند الأطفال المصابين بالربو.

المواضيع والأساليب: كانت هذه دراسة مقطعية في عيادة وقسم الصدر فى مستشفى الأطفال بجامعة عين شمس، القاهرة، مصر (مدة سنة). تمت الدراسة على ٣٥ حالة من مرضى الربو من الأطفال الذين تتراوح أعمارهم بين ٣ –١٠ سنة مع تشخيص موثق للربو.

النتيجة: ظهرت الأعراض التنفسية للمرضى الذين تمت دراستهم حيث ظهرت ٢١ (٦٠٪) بسبب السعال، و٩ (٢٥,٧٪) بسبب ضيق التنفس، و٢٥ (٧١,٤٪) بسبب الصفير، و١٤ (٤٠٪) بسبب عدم تحمل التمارين الرياضية. كانت مستويات الكورتيزول فى الدم (PM) بمتوسط ١٦٧,٦٥ (١١٠,٨٤ – ٢٤٧,٩٧) مع نطاق (١١٠,٢ – ٥٣٨,١).

الاستنتاج: يمكن أن تظهر الأعراض على الأطفال المصابين بالربو، حيث تم عرض ٢١ (٦٠٪) من خلال السعال، و ٩ (٢٥,٧٪) من ضيق التنفس، و ٢٥ (٧١,٤٪) من الصفير و ١٤ (٤٠٪) من عدم تحمل التمارين الرياضية.

كانت مستويات الكورتيزول فى الدم مساء بمتوسط ١٦٧,٦٥ (١١٠,٨٤ – ٢٤٧,٩٧) مع نطاق (١١٠,٢ – ٥٣٨,١).