

*Computerized tomography of  
paranasal sinus in asthmatic  
children*

Thesis

Submitted For fulfillment of Master Degree in pediatrics

By

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## **ABSTRACT**

Asthma is a chronic disease of airways with an underlying inflammatory component. Rhinosinusitis is a common comorbidity of asthma. The association between them seems to be more than epiphenomenon, but it is still a matter of controversy whether a causal relationship exists, wherein rhinosinusitis worsens asthma, or whether they are manifestations in different parts of the respiratory tract of the same underlying disease process. The aim of this study to determine the prevalence of rhinosinusitis in asthmatic children. Thirty asthmatic children aged 3 to 12 years ( $6.66 \pm 4.45$  year) were recruited for the present study. Rhinosinusitis which detected by CT sinus is significantly detected (77% of our patients) in asthmatic children. The total eosinophilic count is significantly high in asthmatic patients who had rhinosinusitis detected by CT sinus. Our results also revealed also that there is insignificant correlation of both total eosinophilic count and IgE level with CT finding , this is in line with that rhinosinusitis and asthma are an expression of a common inflammatory process not always affected by allergy status in which eosinophils and IgE play a central role.

### **Key words:**

Asthma-Rhinosinusitis- Computed tomography (CT) scan

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## **List of abbreviation**

<b>ADAM33</b>	A disintegrin and metalloprotease 33
<b>AHR</b>	Airway hyperresponsiveness
<b>APC</b>	Antigen-presenting cells
<b>b-FGF</b>	basic fibroblast growth factor
<b>BK</b>	Bradykinin
<b>cAMP</b>	cyclic-3,5-adenosine monophosphate
<b>CD4</b>	Cluster of differentiation antigen 4
<b>CIS</b>	Inhaled corticosteroids
<b>CO</b>	carbon monoxide
<b>Cys-LTs</b>	Cysteinyl leukotrienes
<b>EIA</b>	Exercise-induced asthma
<b>FEV1</b>	Forced expiratory volume in the first second
<b>FVC</b>	forced vital capacity
<b>GINA</b>	Global strategy for asthma management and prevention
<b>GM-CSF</b>	granulocyte-macrophage colony-stimulating factor
<b>IgE</b>	Immunoglobulin E
<b>IL</b>	Interleukins
<b>ISAAC</b>	International Study of Asthma and Allergies in Childhood
<b>LABA</b>	Long acting Inhaled-B2 Agonists
<b>LBK</b>	lysylbradykinin
<b>NO</b>	nitric oxide
<b>NSAIDs</b>	non-steroidal anti-inflammatory drugs

<b>O3</b>	Ozone
<b>OMC</b>	ostiomeatal complex
<b>PAF</b>	Platelet activating factor
<b>PDGF</b>	platelet-derived growth factor
<b>PEFR</b>	Peak expiratory flow rate
<b>PGD</b>	prostaglandins
<b>RAST</b>	radioallergosorbent test
<b>SIT</b>	Specific immunotherapy
<b>SPT</b>	Skin-prick testing
<b>TGF-beta</b>	transforming growth factor-beta
<b>Th-cell</b>	T helper cell
<b>TNF</b>	Tumor necrosis factor
<b>Treg</b>	T regulatory
<b>VEGF</b>	vascular endothelial growth factor

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## **INTRODUCTION**

Asthma have been documented to be increasing in children and young adult worldwide. Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role (*GINA, 2008*). The chronic inflammation is associated with airway hyperresponsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread, but variable, airflow obstruction within the lung that is often reversible either spontaneously or with treatment (*Kager and Basel, 2005*).

Rhinosinusitis is a common comorbidity of asthma. The association between them seems to be more than epiphenomenon, but it is still a matter of controversy whether a causal relationship exists, wherein rhinosinusitis worsens asthma, or whether they are manifestations in different parts of the respiratory tract of the same underlying disease process (*Wang et al., 2006*).

The observation that asthma and rhinosinusitis coexist in patients at a higher frequency than would be expected from the prevalence of each in general population provides a strong connection between the upper and lower airways (*Fox and Lockey, 2003*).

Computed tomography (CT) scan of the sinuses are superior to plain radiographs when one needs to study the anatomy, assess pathology, or plan surgical approaches of the sinuses. It is the imaging technique of choice for the study of the nose and paranasal sinuses, and it is considered as "Gold Standard" for diagnosis and management of chronic sinusitis because it also provides an anatomic road map, when surgery is required (*Talay et al., 2008*).

### **AIM OF THE WORK:**

To detect the prevalence of rhinosinusitis (detected by CT sinus) in asthmatic children and to correlate between rhinosinusitis patients , total esinophilic count, and IgE level.

## **DEFINITION OF ASTHMA**

Asthma is a chronic inflammatory disease of airways that affects approximately 300 million people worldwide (*Kemp, 2003*). Since the pathogenesis of asthma still not clear, much of its definition is descriptive. Based on the functional consequences of airway inflammation, an operational description of asthma is: Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role (*GINA, 2008*).

The chronic inflammation is associated with airway hyper-responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread, but variable, airflow obstruction within the lung that is often reversible either spontaneously or with treatment (*Kager and Basel, 2005*).

Its causes and physiopathological mechanisms are various. The final result is a recurrent obstructive bronchial process, with sibilants and/or dyspnea, which causes an upset in functional respiratory tests, among which the maximum respiratory peak flowmeter diminished for age, sex and height of patient (*Hernando et al., 2004*).

## **EPIDEMIOLOGY**

Although asthma patterns vary throughout the world, considerable increases in both the prevalence of asthma and its severity have occurred globally over recent decades (*Bach, 2002& Isolauri et al., 2004& Pearce et al., 2000*), and in spite of significant advances in pulmonary medicine, the prevalence of asthma is increasing both in the developing as well as in the developed countries (*Sekara, 2003*).

Worldwide, 300 million people have asthma . The prevalence is 8-10 times higher in developed countries (e.g., United States, Great Britain, Australia, New Zealand) than in the developing countries. In developed countries, the prevalence is higher in low-income groups in urban areas and inner cities than in other groups (*Mintz, 2004 & Girish et al., 2005*).

Based upon the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire, the 0-7 year incidence for childhood asthma is around 11% and 0-10 years is around 15%. The follow up of asthmatics indicated an almost 5% additional incidence in period 8-10 years of age (*Roel et al., 2005*).

In Egypt 23.2% of wheezy infants were proved to be real asthmatics, but the incidence of asthma among school children aged 5-15 years old was found to be 8.2% (*El-Hefney et al., 1991 & EL Lawindi et al., 2003*).

Asthma may have its onset at any age. Thirty percent of patients are symptomatic by 1 year age, whereas 80% to 90% of asthmatic children have their first symptoms before age of 4 to 5 years (*Sly, 1996*).