The Frequency of Obstructive Sleep Apnea in Asthmatic Patients, and Its Impact on Asthma Control

Thesis

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By

Marwa Salah Helmy

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Under Supervision of

Prof. Dr. Laila M. Abdel Ghaffar Hegazy

Professor of Pediatrics
Faculty of Medicine, Ain Shams University

Dr. Ahmad Mostafa Allam

Lecturer of Pediatrics
Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University

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Marwa Salah Helmy

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List of Abbreviations

Abb.	Full term
AASM	*American Academy of Sleep Medicine*
ACQ	*Asthma control questionnaire*
AECOPD	*Acute exacerbations of chronic obstructive pulmonary disease*
AHI	*Apnea hypopnea index*
AHR	*Airway hyper-responsiveness*
AI	*Apnea index*
AR	*Allergic rhinitis*
BS	*Broullette score*
COPD	*Chronic obstructive pulmonary disease*
CP	*Chlamydia pneumoniae*
DISE	*Drug-induced sleep endoscopy*
ED	*Emergency department*
EEG	*Electroencephalographic*
FEV1	*Forced expiratory volume in 1 second*
FVC	*Forced vital capacity*
HSATs	*Home sleep apnea tests*
ICS	*Inhaled corticosteroids*
IgE	*Immunoglobulin E*
IL-4	*Interleukin4*
LABAs	*Long acting β2 adrenoceptor agonist*
LTRA	*Leukotriene antagonists*
OAI	*Obstructive apnea index*
OSA	*Obstructive sleep apnea*
OSAHS	*Obstructive sleep apnea / hypopnea syndrome*
PEF	*Peak expiratory flow*
PFTS	*Pulmonary function tests*
PSG	*Polysomnogram*
PSQ	*Pediatric Sleep Questionnaire*

List of Abbreviations (Cont...)

Abb.	Full term
QOL	*Patient's quality of life*
RDI	*Respiratory disturbance index;*
REM	*Rapid eye movement*
RERA	*Respiratory effort related arousal*
RERA	*Respiratory effort-related arousal*
SABAs	*Short acting β 2 adrenergic agonists*
SDB	*Sleep-disordered breathing*
SSSDR	*Sleeping Sleepless Sleepy Disturbed Rest questionnaire*
Th2	*T-helper 2*
TIM1	*T-cell immunoglobulin mucin1*
UARS	*Upper airway resistance syndrome*

INTRODUCTION

Asthma is the most common chronic respiratory disorder in childhood with worldwide increasing in its prevalence and global burden ***(Amer et al., 2020)*** the prevalence and morbidity of childhood asthma have been rising evidently during recent decades throughout the world ***(Hansen et al., 2013)***. One major risk factor associated with the increase in asthma is increasing air pollution resulting from the rise in the number of motor vehicles and the presence of industrial processes ***(Idris et al., 2016).*** While outdoor air pollution has received much focus, numerous other risk factors found within the home have been found to be associated with an increase in asthma and allergies. These include changing lifestyles and nutritional habits, breastfeeding and keeping pets ***(Al-Qerem et al., 2016).***

Independent of its impact, pediatric asthma results in significant number of hospitalization and time lost from school and other daily activities and has been associated with poor work and school performance, and >10 million missed school days annually. Asthma-related school absenteeism affects most children 59% of students with asthma miss school annually due to respiratory symptoms ***(Hsu et al., 2016).***

Chronic asthmatic disease also has a negative effect on cognitive abilities, psychosocial behavior and academic achievement of such children ***(Irani et al., 2017).***

In Egypt, bronchial asthma is a significant health problem among school children ***(El-Mashad et al., 2016).***

Obstructive sleep apnea (OSA) is characterized by episodes of complete or partial upper airway obstruction during sleep, often resulting in gas exchange abnormalities and arousals, which disrupt sleep. The condition exists in 1 to 5 percent of children and can occur at any age. Untreated OSA is associated with cardiovascular complications, impaired growth (including failure to thrive), learning problems, and behavioral problems. Early diagnosis and treatment may decrease morbidity ***(Prasad et al., 2020).***

Asthma and obstructive sleep apnea (OSA) may coexist to result in an overlap syndrome where a bidirectional relationship may deleteriously affect each other ***(Min et al., 2016).***

Obstructive sleep apnea (OSA) and asthma are common inflammatory respiratory diseases of childhood. The similarities between and the parallel rise of both diseases raise the question of whether OSA more common in asthmatic children ***(*Azmeh *et al., 2020).***

Aim of the Work

This study aims at evaluating the frequency of obstructive sleep apnea in asthmatic children, and impact of OSA on asthma control.

Chapter 1

BRONCHIAL ASTHMA

Asthma is a heterogeneous disease, characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary overtime and in intensity, together with variable expiratory airflow limitation ***(GINA, 2020)***.

Asthma is a reversible airway obstruction that is characterized by constriction of airway smooth muscle, hyper secretion of mucus, edema and airway hyper responsiveness (AHR), mucus secretion and thickening of the basement membrane underlying the airway epithelium. During the process of airway inflammation, complex interactions of innate and adaptive immune cells as well as structural cells and their cytokines have many important roles. It was believed that airway inflammation is orchestrated by specific allergen ***(Farahani et al., 2014)*.**

Asthma is characterized by a typical infiltrate, including T cells, eosinophils, and mast cells. It is important to keep in mind that the immunopathology of asthma is similar in both allergic and non-allergic form ***(Cecilia et al., 2013)***.

Epidemiology of asthma Prevalence of asthma:

Asthma is one of the most common chronic diseases, with an estimated 300 million patients afflicted by this disease worldwide. The Global Initiative for Asthma (GINA) estimated that more than 10% of the population in Australia, Brazil, Canada, New Zealand, Peru, England, and United States had asthma ***(GINA, 2020)***.

The prevalence of asthma has increased in developed countries over the past 40-50 years and similar trends are emerging in developing countries, especially as they adopt western ways. Different factors underlie the development of asthma in the different parts of the world, atopy being a common risk factor in developed countries while non atopic factors may be responsible for much of asthma in the developing countries ***(Marina et al., 2016).***

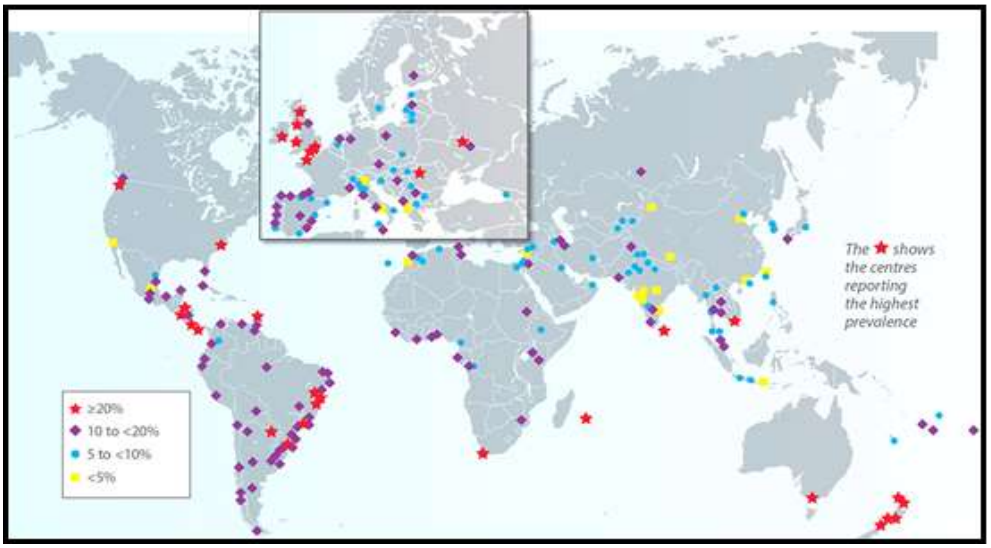

Figure (1): Prevalence of asthma symptoms among 13-14 years old ***(GINA, 2020)***.

Incidence and prevalence of pediatric asthma in Egypt:

The prevalence of asthma in Egyptian school children 9.4 % the asthma prevalence is more evident in urban areas as compared to rural areas. Exposure to environmental tobacco smoke, air pollution and bad housing conditions are important determinants of asthma and may explain the trend of increased asthma in Egyptian school children ***(Amer et al., 2020).***

Mortality and morbidity of asthma:

According to the WHO estimations, asthma deaths outnumbered more than 250,000 persons per year all over the world. The factors underlying increased asthma morbidity may include: increased severity of the disease, under-treatment of patients with anti-inflammatory therapy, over-reliance on bronchodilators, and delay in seeking medical help during an exacerbation. Poverty also appears to be a risk factor ***(Webley and Hahn, 2017)***.

Pathogenesis of asthma:

Asthma is an airway disease that can be described physiologically as a variable and partially reversible obstruction to the air flow and pathologically as overdeveloped mucus glands, broncho-constriction due to the tightening of the surrounding smooth muscles and thickening due to inflammation and scarring**.** Bronchial inflammation also causes narrowing due to edema and swelling caused by an immune response to allergens ***(GINA, 2020).***