



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

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لَسْبَحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

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List of Contents

Title	Page No.
List of Tables	i
List of Figures	iii
List of Abbreviations.....	iv
Introduction.....	1
Aim of the Work.....	3
Review of Literature	
Bronchial Asthma	4
Obstructive Sleep Apnea (OSA).....	47
Patients and Methods	85
Results.....	95
Discussion.....	110
Summary	120
Conclusion	124
Recommendations.....	125
References	126
Arabic Summary.....	١

List of Tables

Table No.	Title	Page No.
Table (1):	Triggers of asthma:.....	17
Table (2):	Classification of asthma severity by clinical features:	24
Table (3):	Level of asthma control.....	35
Table (4):	Summary measures s are generally used for the diagnosis of OSA and for assessment of severity.	75
Table (5):	Asthma diagnosis:	87
Table (6):	OSA symptoms:	88
Table (7):	Asthma control questionnaire (ACQ).....	93
Table (8):	Sex distribution among studied patients:.....	95
Table (9):	Age of study population (mean and SD):	95
Table (10):	Weight and height percentile among studied population (number and percent):	96
Table (11):	Types of bronchial asthma in studied patients:.....	96
Table (12):	Number of hospital admission and picu admission in studied patients:	97
Table (13):	Compliance to treatment among asthmatic patient selected:.....	97
Table (14):	Control of asthma in children according to GINA assessment of asthma control questionnaire;	98
Table (15):	Types of medication used to control bronchial asthma in asthmatic children:.....	98
Table (16):	Number of drugs used in asthma control:	98
Table (17):	Score of (OSA-18) for Pediatric Obstructive Sleep Apnea among studied patients (mean and SD):	99

List of Tables (Cont...)

Table No.	Title	Page No.
Table (18):	Pulmonary function (spirometry) of study population (mean and SD):	99
Table (19):	OSA-18 Questionnaire:.....	99
Table (20):	Results of sleep study:.....	100
Table (21):	Polysomnogram results:	101
Table (22):	Correlation between OSA score and gender: ..	104
Table (23):	Correlation between OSA and age:	104
Table (24):	Correlation of OSA score and weight and height percentile:.....	104
Table (25):	OSA score and its relation with times of hospital admission:	105
Table (26):	OSA score in relation to PICU admission in asthmatic children:	105
Table (27):	Correlation between OSA score and pulmonary function and asthma control:	106
Table (28):	Correlation between types of asthma and the OSA score in studied children:	106
Table (29):	Compliance of asthmatic children to treatment and its relation to OSA score:	107
Table (30):	Bronchial asthma control and its relation to OSA score in studied patients:	107
Table (31):	Differences of asthma control between patients on inhaled corticosteroids and patients not in ICS:.....	108
Table (32):	Differences of asthma control between patients used long acting beta agonist and patients not used LABA:	108
Table (33):	Differences of asthma control between patients used Leukotriene modifier and patients not used Leukotriene modifier:.....	109

List of Figures

Fig. No.	Title	Page No.
Figure (1):	Prevalence of asthma symptoms among 13-14 years old.....	5
Figure (2):	Factors limiting airflow in acute and persistent asthma.....	8
Figure (3):	Airway remodeling during the attack.....	10
Figure (4):	Triggers of asthma	18
Figure (5):	The goals of asthma management.....	33
Figure (6):	Asthma management is approach based on control	36
Figure (7):	Obstructive sleep apnea.....	48
Figure (8):	Standardized grading of tonsil size	50
Figure (9):	Children with allergic rhinitis may display "allergic shiners" and "adenoid facies," resulting from longstanding mouth-breathing..	55
Figure (10):	Palate with a high and narrow maxillary arch in a patient with obstructive sleep apnea.....	64
Figure (11):	Large tonsils often accompany obstructive sleep apnea in children	64
Figure (12):	The modified Mallampati classification is a simple scoring system that relates the amount of mouth opening to the size of the tongue, and provides an estimate of space available for oral intubation by direct laryngoscopy.....	65
Figure (13):	The OSA-18 quality of life questionnaire.	68
Figure (14):	(A) Narrow palate in patient with obstructive sleep apnea, prior to maxillary expansion (RME). (B) Appearance of maxilla after expansion, with the RME device in place	84

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

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*).

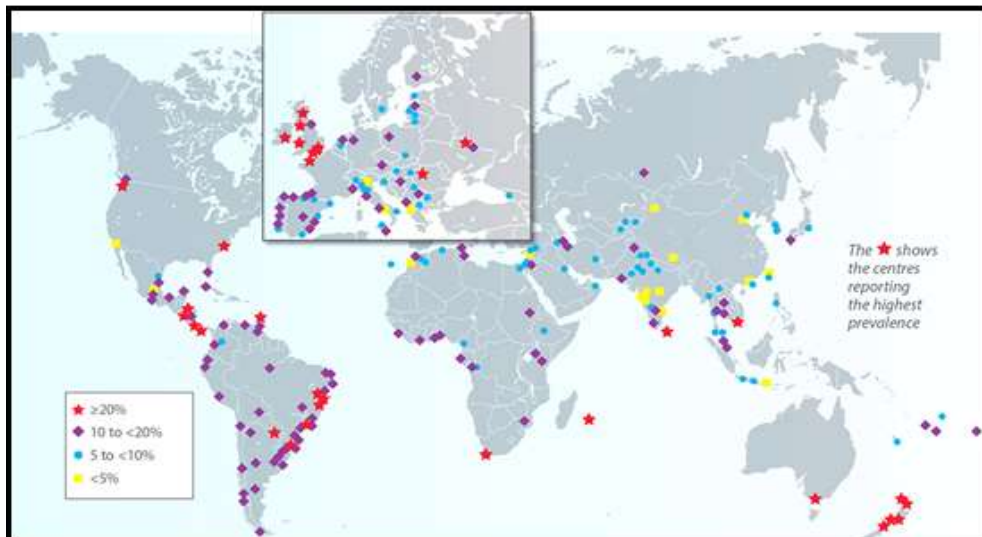


Figure (1): Prevalence of asthma symptoms among 13-14 years old (*GINA, 2020*).

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*).