

**Study of Relation of Sleep apnea in  
Chronic Hemolytic Anemia Patients to Left  
Ventricular Hypertrophy and Diastolic  
Dysfunction in Comparison to  
Normal Children**

Thesis

*Submitted for Partial Fulfillment of M.Sc Degree  
in Pediatrics*

By

**Mariam Mahmoud Abdelnaby**

*M.B., B. Ch. (2010)*

*Faculty of Medicine -AinShamsUniversity*

Under Supervision of

**Prof. Dr. Mohsen Saleh Elalfy**

*Professor and Head of Pediatrics Department*

*Faculty of Medicine –Ain Shams University*

**Dr. Omneya Ibrahim youssef**

*Assistant Professor of Pediatrics*

*Faculty of Medicine –Ain Shams University*

**Dr. Marwa Mohamed Reda**

*Lecturer of Pediatrics*

*Faculty of Medicine –Ain shams university*

**Faculty of Medicine  
AinShamsUniversity**

**2015**



## Acknowledgment

First of all, my deepest and greatest gratitude and thanks to **ALLAH** for helping and supporting me to present this modest work.

In fact, I can't find meaningful words to express my extreme thankfulness, profound gratitude and deep appreciations to my eminent **Prof. Dr. Mohsen Saleh Elalfy**, Professor and Head of Pediatrics Department, Faculty of Medicine- Ain Shams University for his majestic generous help, guidance, kind encouragement and great fruitful advice during supervision of this work.

Also I'm deeply grateful to **Dr. Omneya Ibrahim youssef**, Assistant Professor of Pediatrics Faculty of Medicine- Ain Shams University for her valuable help, assistance, to facilitate the production of this work.

And thanks to **Dr. Marwa Mohamed Reda**, Lecturer of Pediatrics Faculty of Medicine- Ain Shams University for her great efforts and support throughout this work.

I would like also to express my sincere appreciation and gratitude to **Dr. Adel Maraie**, Assistant Lecturer of neuropsychiatry and sleep medicine, for his support throughout the whole work.

Finally, I would like to express my deepest thankfulness to my **Family special my parents, my sister and my brother** for their great help and support whom without I could do nothing.

**Mariam Mahmoud Abdelnaby**



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# *List of Abbreviations*

<b>Abb.</b>	<b>Meaning</b>
<b>2,3- DPG</b>	2,3 Di-phosplacglycerate
<b>AASM</b>	American acadmy of sleep medicine
<b>ACEI</b>	Angiotensin converting enzyme
<b>AHI</b>	Apnea hypopnea index
<b>A<sub>m</sub></b>	Late diastolic peak velocity
<b>AT</b>	Adenotonsillectomy
<b>AVN</b>	Avascular necrosis
<b>Awave</b>	Peak velocity at time of atrial contraction
<b>BiPAP</b>	Bilevel positive airway pressure
<b>BNP</b>	Brain naturetic peptide
<b>BP</b>	Blood pressure
<b>Bpm</b>	Beat per minute
<b>Cl</b>	Chloride
<b>CPAP</b>	Continous positive airway pressure
<b>CSA</b>	Central sleep apnea
<b>CSB</b>	Cheyne stokes breathing
<b>DFO</b>	Desferoxamine
<b>DFP</b>	Deferiprone
<b>DFX</b>	Deferasirox
<b>DHF</b>	Diastolic heart failure
<b>E wave</b>	Peak early diastolic flow velocity
<b>E/A ratio</b>	Ratio between early and late peaks of flow velocity

<b>Abb.</b>	<b>Meaning</b>
<b>E/E<sub>m</sub></b>	Ratio of transmitral flow velocity to annular velocity
<b>EDS</b>	Excessive daytime sleepiness
<b>EF</b>	Ejection fraction
<b>E<sub>m</sub></b>	Early diastolic peak velocity
<b>E<sub>m</sub>/A<sub>m</sub></b>	Ratio of early to late annular velocity
<b>ESS</b>	Epworth sleepiness scale
<b>gm/dL</b>	Gram per deciliter
<b>H. influenza</b>	Hemophilous influenza
<b>HB</b>	Hemoglobin
<b>HBA</b>	Adult hemoglobin
<b>HBF</b>	Fetal hemoglobin
<b>HbGI</b>	Hemoglobin gower I
<b>HDL</b>	High density lipoproteins
<b>HF</b>	Heart failure
<b>HFNEF</b>	Heart failure with normal ejection fraction
<b>HFSA</b>	Heart failure society of America
<b>HGBII</b>	Hemoglobin gower II
<b>HPLC</b>	High performance liquid chromatography
<b>IEF</b>	ISO electric focusing
<b>IFN</b>	Interferon
<b>IG</b>	Immunoglobulin
<b>IGG</b>	Immunoglobulin G
<b>IGM</b>	Immunoglobulin M
<b>IL</b>	Interleukin

<b>Abb.</b>	<b>Meaning</b>
<b>IV</b>	Intravenous
<b>K</b>	Potassium
<b>LA</b>	Left atrium
<b>LDL</b>	Low density lipoproteins
<b>LV</b>	Left ventricle
<b>LVEDD</b>	Left ventricular end diastolic diameter
<b>LVEF</b>	Left ventricular ejection fraction
<b>LVESD</b>	Left ventricular end systolic diameter
<b>LVMI</b>	Left ventricular mass index
<b>LVMPI</b>	Left ventricular myocardial performance index
<b>MCV</b>	Mean corpuscular value
<b>mg</b>	Milligram
<b>mg/Kg</b>	Milligram per kilogram
<b>ml</b>	Milliliter
<b>MRI</b>	Magnetic resonant imaging
<b>NEP</b>	Negative expiratory pressure
<b>NK</b>	Natural killer
<b>NO</b>	Nitric oxide
<b>NREM</b>	Non rapid eye movement
<b>NTBI</b>	Non- transferrin binding iron
<b>OSA</b>	Obstructive sleep apnea
<b>OSAS</b>	Obstructive sleep apnea syndrome
<b>PA</b>	Pulmonary artery
<b>PASP</b>	Pulmonary artery systolic pressure
<b>PCA</b>	Patient controlled analgesia

<b>Abb.</b>	<b>Meaning</b>
<b>P<sub>crit</sub></b>	Critical closing pressure
<b>PCWP</b>	Pulmonary capillary wedge pressure
<b>PRR</b>	Pattern recognition receptor
<b>PSG</b>	Polysonography
<b>PSQI</b>	Pittsburgh sleep quality index
<b>RBC</b>	Red blood cell
<b>REM</b>	Rapid eye movement
<b>RNA</b>	Ribonucleic acid
<b>ROS</b>	Reactive oxygen species
<b>RV</b>	Right ventricle
<b>RVDD</b>	right ventricular diastolic diameter
<b>RVESP</b>	Right ventricular end systolic pressure
<b>S.pneumoniae</b>	Streptococous pneumonia
<b>SCD</b>	Sickle cell disease
<b>SD</b>	Standard deviation
<b>SFF</b>	Systolic filling fraction
<b>SHF</b>	Systolic heart failure
<b>S<sub>m</sub></b>	Systolic peak velocity
<b>SPO<sub>2</sub></b>	Oxygen saturation
<b>T(regs)</b>	T regulatory lymphocytes
<b>TDI</b>	Tissue Doppler imaging
<b>TNF</b>	Tumor necrosis factor
<b>TRjet</b>	Tricuspid regurgent jet velocity
<b>TST</b>	Total sleep time
<b>TTE</b>	Transthoracic echo
<b>TuCASA</b>	Tucson children's assessment of sleep apnea
<b>TVI</b>	Velocity time integral
<b>βTM</b>	β-thalasemia major

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## Introduction

Obstructive sleep apnea syndrome (OSAS) is a common condition in childhood and can result in severe complications if left untreated (*Marcus et al., 2012*).

OSAS in children is defined as a “disorder of breathing during sleep characterized by prolonged upper airway obstruction and/or intermittent complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns (*American Thoracic Society, 1996*).

The main characteristics are repetitive apnea or hypopnoea induced by narrowing of the upper airways during sleep. Hypoxia and hypercapnia due to repetitive obstructive apnea consequently affect the balance in myocardial oxygen demand and supply. The result is consequent development of myocardial ischemia and compensatory activation of sympathetic nervous system. The cardiovascular involvement is an increase in left ventricular (LV) after load and a decrease in LV preload (*Leong et al., 2013*).

There was a study which reviewed studies on the epidemiology of conditions considered part of a pediatric sleep disordered breathing (SDB) continuum, ranging from primary snoring to OSA. estimated population prevalences