



Medical Studies Department

**Comparative Study between Pediatric
Asthma Severity Score and Pulmonary
Score in the Evaluation of the Severity of
Acute Asthmatic Attacks in Children**

Thesis submitted for fulfillment of PhD in Childhood Studies
Medical Studies Department
(Child Health and Nutrition)

By

Lamia Mokhtar Elrafie

M.B.B.Ch.,Msc (Pediatrics)

Supervisors

Prof. Dr.Khaled Hussien Taman

Professor of Pediatrics

Vice-Dean of Institute of Postgraduate

Childhood Studies

Ain Shams University

Dr. Malak Ali Shaheen

Assist. Professor of Pediatrics

Pulmonology unit

Faculty of medicine- Ain Shams University

٢٠٠٧



قسم الدراسات الطبية

دراسة مقارنة بين مقياس شدة الربو الشعبي عند الأطفال والمقياس
الرئوي في تقييم شدة أزمات الربو الشعبي الحادة في الأطفال

(قسم صحة وتغذية الطفل)

إعداد

الطبيبة/ لمياء مختار الرفاعي

ماجستير طب الأطفال

تحت إشراف

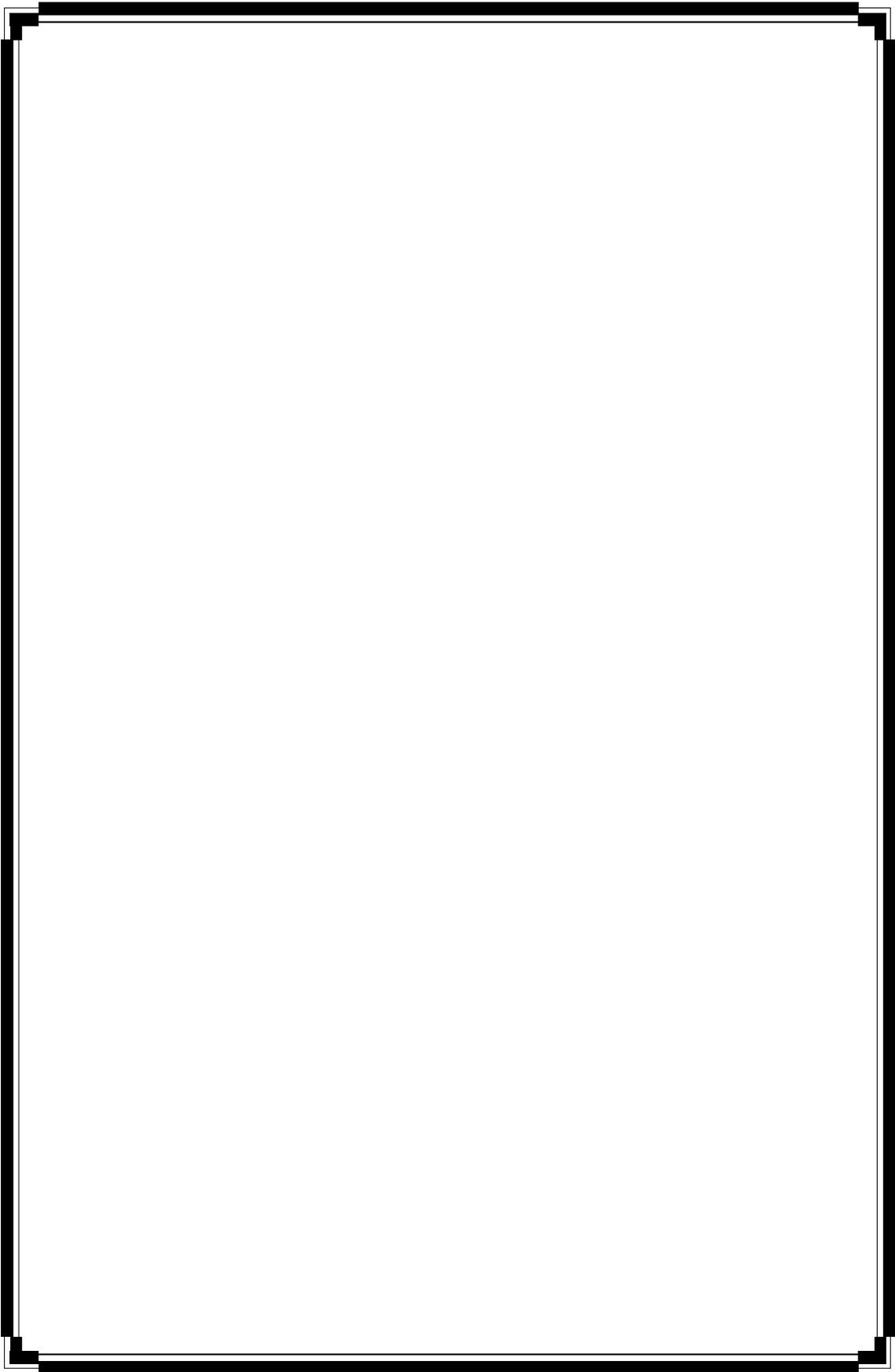
/ . .

ووكيل معهد الدراسات العليا للطفولة
جامعة عين شمس

/ .

الأمراض الصدرية
كلية الطب - جامعة عين شمس

٢٠٠٧



ABSTRACT

Introduction: Assessment of the severity of the asthmatic attacks is an important principle to direct the patients to the proper way of management according to the guidelines of therapy. **Purpose :** To compare between pediatric asthma severity score "PASS" and pulmonary score "PS" as clinical tools of assessment and the objective tools like peak flow meter, pulse oximetry and arterial blood gases analyzer.

Methodology: One hundred children had acute asthmatic attacks participated in this study. Severity of their attacks were assessed before treatment, minutes and hours after treatment. Assessment was done by using both "PASS", "PS", as well as peak flow meter, pulse oximetry and arterial blood gases analyzer .

Results: There was significant association between "PASS" and peak expiratory flow rate "PEFR" before treatment,

minutes and hours after treatment. There was also significant association between "PS" and "PEFR" before treatment, minutes and hours after treatment. There was no association between either "PASS" or "PS" scores and oxygen saturation, before and after minutes of treatment.

While there was significant association between both "PASS" and "PS" scores and oxygen saturation, after hours of treatment. There was also no association between either "PASS" or "PS" scores and arterial blood gases before treatment.

Conclusion: "PASS" and "PS" are of clinical utility in assessing the severity of asthmatic attacks especially if the patient is unable to use the peak flow meter or when pulse oximetry or the peak flow meter are not available.

Key words : Acute asthma, assessment, pediatric asthma severity score, pulmonary score, peak flow meter, pulse oximetry, arterial blood gases.

Contents

	Page
Abstract	
List of Abbreviations	i
List of Tables	iv
List of Figures	vii
Introduction	
Aim of the Study	
Review of Literature	
Chapter : Pediatric Bronchial asthma	
Chapter : Acute Attacks of Asthma and Assessment of Asthma Severity	
Patients and Methods	
Results	
Discussion	
Summary& Conclusion	
Recommendations	
References	
Appendices	
Arabic Summary	

List of Abbreviations

ABGs:	Arterial blood gases
ADAM³³:	Adisintegrin and metalloprotease
AHR:	Airway hyperresponsiveness
AIDS:	Acquired immune deficiency syndrome
ASS:	Asthma severity score
BAL:	Broncho alveolar lavage
BHR:	Bronchial hyperresponsiveness
BMI:	Body mass index
CAS:	Clinical asthma score
CO:	Carbon monoxide
ED:	Emergency Department
EIA:	Exercise induced asthma
EIB:	Exercise induced bronchospasm
ELISA:	Enzyme linked immunosorbent assay
FEV₁:	Forced expiratory volume in one second
FiO₂:	Fraction inspired oxygen
FVC:	Forced vital capacity
GINA:	Global initiative for asthma
H₂CO₃:	Carbonic acid
HRCT:	High resolution computed tomography

List of Abbreviations

HIV:	Human immunodeficiency
IFN-γ:	Interferon gamma
Ig:	Immunoglobulin
IL 1, 2, 6:	Interleukin 1, 2, 6
LR:	Likelihood ratio
MDI:	Metered dose inhaler
NAEP:	National asthma education and prevention program
NaHCO₃:	Sodium bicarbonate
NHLBI:	National Heart blood lung Institute
NO:	Nitric oxide
O₂SAT:	Oxygen saturation
PaCO₂:	Pressure arterial carbon dioxide
PaO₂:	Pressure arterial oxygen
PASS:	Pediatric asthma severity score
PEEP:	Positive end – expiratory pressure
PEFR:	Peak expiratory flow rate
PI:	Pulmonary index
PPV:	Positive predictive value
PRAM:	Preschool respiratory assessment measure
PS:	Pulmonary score
RAST:	Radioallergosorbent test

List of Abbreviations

ROC:	Receiver operating characteristics curve
SD:	Standard deviation
TH₁:	T-helper
TH₂:	T-helper
URTIS:	Upper respiratory tract infections
WHO:	World Health Organization

List of Tables

Table	Title	Page
Table (١):	Asthma Risk Factors and Actions to reduce Exposure	
Table (٢):	Symptoms of Exercise-Induced Bronchospasm	
Table (٣):	How to establish the diagnosis of Asthma	
Table (٤):	Classification of asthma by level of control	
Table (٥):	Severity of Asthma Attacks	
Table (٦):	Characteristics of Validated Pediatric Asthma Scores	
Table (٧):	Asthma Severity Scale	
Table (٨):	Clinical asthma score	
Table (٩):	The 5-point PRAM	
Table (١٠):	The pulmonary index score	
Table (١١):	Pulmonary score	
Table (١٢):	Pediatric Asthma severity score	
Table (١٣):	Responses to Initial Treatment	
Table (١٤):	Glossary of asthma medications - Reliever medications	
Table (١٥):	Predicted Normal Values of PEF	
Table (١٦):	General Features	
Table (١٧):	Gender	
Table (١٨):	Family history of asthma	
Table (١٩):	Admission during the study	
Table (٢٠):	Peak flow rate during the study	
Table (٢١):	Biochemical measurements of the study	
Table (٢٢):	Classification of severity of asthmatic children by different studied tools before treatment	

✍ List of Tables & Figures ✍

Table	Title	Page
Table (٢٣):	Classification of severity of asthmatic children by different studied tools after min. of treatment	
Table (٢٤):	Classification of severity of asthmatic children by different studied tools hours after treatment	
Table (٢٥):	The association between pediatric asthma severity score (PASS) and peak expiratory flow rate (PEFR) before treatment.	
Table (٢٦):	The association between pulmonary score (PS) and peak expiratory flow rate (PEFR) before treatment	
Table (٢٧):	The association between pediatric asthma severity score "PASS" and oxygen saturation "O SAT" before treatment.	
Table (٢٨):	The association between pulmonary score "PS" and oxygen saturation "O SAT" before treatment	
Table (٢٩):	The association between pediatric asthma severity "PASS" and peak expiratory flow rate "PEFR" after minutes of treatment.	
Table (٣٠):	The association between pediatric asthma severity score "PASS" and oxygen saturation "O SAT" after minutes of treatment.	
Table (٣١):	The association between pulmonary score "PS" and oxygen saturation "O SAT" after minutes of treatment	
Table (٣٢):	The association between pulmonary score "PS" and peak expiratory flow rate "PEFR" after minutes of treatment.	

✍ List of Tables & Figures ✍

Table	Title	Page
Table (३३):	The association between pediatric asthma severity score "PASS" and peak expiratory flow rate "PEFR" after hour of treatment.	
Table (३४):	The association between pediatric asthma severity score "PASS" and oxygen saturation "O SAT" after hours of treatment	
Table (३५):	The association between pulmonary score "PS" and peak expiratory flow rate "PEFR" score after hours of treatment.	
Table (३६):	The association between pulmonary score "PS" and oxygen saturation "O SAT" after hours of treatment.	
Table (३७):	The number of patients with different grades of asthma having same results with studied tools.	
Table (३८):	The association between peak expiratory flow rate (PEFR) and oxygen saturation (O SAT) before treatment.	
Table (३९):	Measure of agreement between peak expiratory flow rate (PEFR) and oxygen saturation (O SAT) before treatment	
Table (४०):	Measure of agreement between pulmonary score "PS" and peak expiratory flow rate (PEFR) before treatment	
Table (४१):	Measure of agreement between pulmonary score "PS" and peak expiratory flow rate (PEFR) before treatment	

List of Figures

Figure	Name	Page
Fig. (١):	Pathogenesis of asthma	
Fig. (٢):	Pathological features for asthma	
Fig. (٣):	Mechanisms of air way inflammation in asthma	
Fig. (٤):	Inflammation and remodeling in asthma	
Fig. (٥):	Using a Spirometer	
Fig. (٦):	Peak Flow Meter	
Fig. (٧):	The use of peak flow meter	
Fig. (٨):	The use of Pulse oximetry	
Fig. (٩):	Blood gas analyzer	
Fig. (١٠):	Distribution of asthmatic patients according to family history of asthma	
Fig. (١١):	Distribution of asthmatic patients according to hospital admission during the study.	
Fig. (١٢):	Bar chart shows" PEFr" measurements before, min. and after hours of treatment.	
Fig. (١٣):	Bar chart shows oxygen saturation measurements before ,after min. and hours of treatment	
Fig. (١٤):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PASS" and "PEFR" before treatment	
Fig. (١٥):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PS" and" PEFr" before treatment.	

✎ List of Tables & Figures ✎

Fig. (١٦):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PAAS' and "PEFR" after minutes of treatment.	
Fig. (١٧):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PS" and PEFr after minutes of treatment	
Fig. (١٨):	Bar chart shows different degrees of severity of asthmatic patients as assessed with 'PAAS" and PEFr after hours of treatment	
Fig. (١٩):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PASS' and oxygen saturation after hours of treatment .	
Fig. (٢٠):	Bar chart shows different degrees of severity of asthmatic patients as assessed with "PS' and "PEFR" after hours of treatment	
Fig. (٢١):	Bar chart shows different degrees of severity of asthmatic patients as assessed with 'PS" and oxygen saturation after hours of treatment .	
Fig. (٢٢):	Comparison between measurements of "PEFR" and oxygen saturation before ,after min. and after hr.of treatment.	

✎ List of Tables & Figures ✎

Fig. (۲۳):	Receiver operating characteristic (ROC) curves for Pediatric asthma severity score (PASS) and pulmonary score (PS) compared to severity determined by peak expiratory flow rate before treatment .	
Fig. (۲۴):	Receiver operating characteristic (ROC) curves for pediatric asthma severity score (PASS) and pulmonary score (PS) compared to severity determined by peak expiratory flow rate after min .treatment	