Pediatric Respiratory Assessment Measure (PRAM Score) in Comparison with Modified pulmonary Index Score (MPIS) in the Assessment of the Severity of Acute Asthma Attack in Asthmatic Children between Two to Fourteen Years of Age

Thesis

Submitted for Partial Fulfillment of M.Sc in Pediatrics

By

May Abdallah Mohamed Sary

M.B, B.Ch

Supervisors

Dr. Manal El Sayed Abd El Meguid

Professor of Pediatrics

Faculty of Medicine, Cairo University

Dr. Azza Kamal Abd El Megeid

Assistant Professor of Pediatrics

Faculty of Medicine, Cairo University

Faculty of Medicine

Cairo University

2015

Acknowledgment

Thanks to **Allah** *greater of all for helping me to complete this work.*

I would like to express my deepest gratitude and profound thanks to ***Dr. Manal El Sayed Abd El Meguid,*** *Professor of Pediatrics, Faculty of Medicine, Cairo University, for her continuous encouragement, guidance, and kind supervision.*

I would like to express my gratitude and thanks to ***Dr. Azza Kamal Abd El Megeid,*** *Assistant Professor of Pediatrics, Faculty of Medicine, Cairo University, for his invaluable guidance, keen suggestion and time he freely gave, throughout the whole work.*

Finally, no words can describe my appreciation for my parents, brother and sister who provided me with everything I needed. Without them, getting a professional degree would have been impossible, I thank them for all the prayers they made to help me through my research.

May Abdallah

Abstract

Objectives: To test the PRAM score in comparison with MPIS as objective tools for assessment of the severity of acute asthma exacerbation.

Study design: A cross sectional study was adopted by applying the [PRAM] score and [MPIS] on 100 asthmatic children aged from two to fourteen years old presented to the emergency department of Abu El-Reesh Cairo University Children's hospital by acute asthma exacerbation, both scores were tested initially, one hour post inhaled bronchodilator and at discharge.

Results: This study included 57 boys and 43 girls, with mean age of 5.05±2.4 years, there was highly statistical significant difference initially between PRAM and MPIS, but no statistical significant difference between them after initial bronchodilator therapy and at discharge and there was highly statistical significant relation between fate and calculated scores by both PRAM and MPIS.

Conclusions: Acute asthma is a leading cause for hospitalization. No specific tool for evaluation of acute asthma severity is actually in use. PRAM score is a valid, reliable and good predictive tool for evaluation of severity acute asthma.

Keywords:

Asthma, PRAM, MPIS, Pediatrics.

List of Contents

List of Abbreviations

Abb.	Full term
ADAM33	Disintegrin and Metalloproteinase Domain-Containing Protein 33
AHR	Airway Hyperresponsiveness
APC	Antigen Presenting Cells
BD	Bronchodilator
BECs	Bronchial Epithelial Cells
BMI	Body Mass Index
CAMP	Cyclic Adenosine Monophosphate
CAS	Childhood Asthma Study
COPD	Chronic Obstructive Pulmonary Disease
DC	Dendritic Cells
ECM	Extracellular Matrix
FeNO	Fractional Exhaled NO
FEV1	Forced Expiratory Volume in the First Second (The Volume of Air Exhaled During the First Second of this Maneuver)
FGF	Fibroblast Growth Factor
FLG	Filagrin
FVC	Forced Vital Capacity (Air Forcibly Exhaled from the Point of Maximal Inhalation)
GINA	Global Initiative For Asthma
GM-CSF	Granulocyte-Macrophage Colony-Stimulating Factor
HS	Highly Significant
ICON	International Consensus on Pediatric Asthma
ICS	Inhaled Corticosteroids
IFN	Interferon
IgE	Immunoglobulin E
IL	Interleukin
LABA	Long-Acting Inhaled β2-Agonists
MBP	major Basic protein
MMP	Matrix Metalloproteases
MPIS	Modified Pulmonary Index Score
NAEPP	National Asthma Education and Prevention Program
NO	Nitric Oxide
NS	Non-Significant

List of Abbreviations (Cont…)

Abb.	Full term
PCO2	Partial Pressure of Carbon Dioxide
PDGF	Platelet-Derived Growth Factor
PEF	Peak Expiratory Flow
PEFR	Peak Expiratory Flow Rate
PRAM	Pediatric Respiratory Assessment Measure
RSV	Respiratory Syncytial Virus
SABA	Short Acting B2 Agonist
SaO2	Saturation Level of Oxygen In Hemoglobin
SD	Standard Deviation
TCRs	Tucson Children's Respiratory Study (TCRS)
TGF	Transforming Growth Factor
Th	T Helper Cells
TNF	Tumor Necrosis Factor
VEGF	Vascular Endothelial Growth Factor

List of Tables

List of Tables (Cont…)

List of Tables (Cont…)

List of Figures

List of Figures (Cont…)

List of Figures (Cont…)

INTRODUCTION

Asthma is the leading chronic disease in childhood and asthma exacerbations are one of the most common medical reasons for children to be brought to the hospital emergency department (ED). These visits, and the subsequent hospitalizations required by a large proportion of patients, account for more than 60% of all costs of asthma care ***(Farion et al., 2013).***

Prevention of asthma morbidity requires assessment of asthma severity and control, which include two domains: (1) impairment, which includes an evaluation of the frequency and intensity of symptoms; and (2) risk, which includes an assessment of the likelihood of asthma exacerbations. Patients with persistent symptoms from asthma were more likely to experience severe asthma exacerbations. Nevertheless, demographic and laboratory predictors of having persistent symptoms are different from predictors of severe asthma exacerbations. Although symptoms and exacerbations are closely related, their predictors are different ***(Wu et al., 2011).***

Accurate measurement of acute asthma severity is important both for decision making and for evaluation of treatment effectiveness. Pulmonary function tests, such as spirometry and peak expiratory flow rate (PEFR), provide objective data on the severity of airway obstruction, but these tests are difficult to perform in young children because of their lack of coordination and comprehension, particularly during asthma attacks. Given that pulmonary function tests are often not feasible or

reliable in young children, more than ten clinical scores have been developed to assess asthma severity ***(Vichyanond et al., 2013).***

‘‘Asthma control’’ refers to the extent to which the manifestations of asthma have been reduced or removed by treatment. Its assessment should incorporate the dual components of current clinical control In 1984, Becker and colleagues introduced Pulmonary Index (PI) developed for assessing severity of acute asthma in children presenting to the ED and to predict admission to the hospital and then in 2005 Carroll et al. developed and evaluated the Modified Pulmonary Index Score which includes six items: (1) oxygen saturation on room air (SpO2), (2) accessory muscle use, (3) inspiratory-to-expiratory flow ratio (I:E ratio), (4) degree of wheezing, (5) heart rate (HR) and (6) respiratory rate (RR). For each of these items, a score of 0 to 3 is assigned based on the severity. The range of total score is 0 to 18. The higher the total score is, the more severe the condition ***(Maekawa et al., 2014).***

Birken et al. identified the preschool respiratory assessment measure (PRAM). This measure include five criteria, one objective criterion and four clinical criteria, three of them namely suprasternal retraction, air entery and wheezing are consistently found in most pediatric asthma scores. The fourth clinical criterion is the presence of scalene muscle contraction, which is present in cases of sever airway obstruction. The objective criterion is the measurement of oxygen saturation ***(Ducharme et al., 2008).***

PRAM was originally validated only in asthmatic preschool children, until Ducharme et al in 2008, used the PRAM score in asthmatic children aged from 2 to 17 years at triage, one hour after initial

bronchodilator and at disposition, they found that it is feasible, valid, responsive and reliable tool to determine asthma severity in both preschool and school aged children. PRAM at triage had high predictive ability as it shows high association with admission rates, and PRAM measured one hour after initial bronchodilator had high predictivity that it can be used to further adjust therapy. Ducharme et al changed the name of the score from the preschool respiratory assessment measure to pediatric respiratory assessment measure with the same abbreviation (PRAM) ***(Ducharme et al., 2008).***