Blood lead level and it's relation to bronchial asthma in children

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Adel Besheer Ahmed

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا

إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة الآية (32)

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List of Abbreviation

Abbrev.	
AAAS	American Association for the Advancement of Science.
ACQ	Asthma Control questionnaire.
ACT	Asthma Control test.
AHR	Airway hyper responsiveness.
ALA	Aminolevulinic Acid.
ALAD	Aminolevulinic acid dehydratase.
ATSDR	Agency for Toxic Substances and Disease Registry.
BLL	Blood lead level.
CDC	Centers for disease control.
CDCP	Centers for Disease Control and Prevention.
CLP	Chronic lead poisoning.
EDTA	Ethylene diamine tetra acetate.
EIB	Exercise induced Bronchial asthma.
ELIZA	Enzyme-linked immunosorbent assay.
EPA	Environmental Protection Agency.
EP	Erythrocyte protoporphyrine.

EPR	Expert Panel Report.
ETS	Environmental tobacco smoke.
FVC	Forced vital capacity.
GINA	Global Initiative for Asthma.
HDM	House dust mites.
IARC	International Agency for Research on cancer .
ICS	Inhaled Corticosteroid.
IQ	Intelligence quotient.
MCV	Mean corpuscular volume.
MDI	Meter-dose inhaler.
NHLBI	National Heart, Lung, and Blood Institute.
PEFR	Peak Expiratory Flow Rate.
PFTs	Pulmonary function tests.
SABA	Short Acting B2 Agonist.
SES	Socioeconomic state.
T h	T helper.
ZPP	Zinc protoporphyrin.

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Introduction

Asthma is a common medical problem encountered by clinicians dealing with children. Its incidence substantially increased worldwide. It is a major cause of morbidity and mortality among the pediatric age group; it is a chronic inflammatory condition of the lung airways resulting in episode obstruction **(Ramakrishanan et al., 2010).**

Asthma is common in industrialized nations. The prevalence rate of severe asthma in industrialized countries ranges from 2- 10 %. Recent trends suggest an increase in both the prevalence and morbidity of the disease especially in children younger than 6 years **(Hartert, 2006).**

Children are more in danger of lead exposures due to their natural 'pica' behavior that leads to the ingestion of lead based paint chips left in buildings/housing units. This ultimately leads to the increase of blood lead level in children. Children, pound for pound, consume more food / water than adults do and breathe more air because of their high metabolism and substantial growth. This makes them more at harm because although children on average may ingest less lead than adults due

To their high rate of metabolism, children are still two to three times more prone to exposure. Children absorb about fifty percent of lead that is ingested which is a rate that is five times greater than adult**. (Voorhis, 2010**).

The immune system is one of the targets most sensitive to lead toxicity, and the association between lead Exposure and serum immunoglobulin E (IgE) has been published. Recent studies also reported that lead caused the development of IgE mediated allergy (**Min et al., 2008).**

Metal toxicants which affect the immune system may affect to an increased incidence of autoimmune diseases and cancer in the recent past. There has been a growing concern among health and environmental scientists on the impact of environmental exposure to heavy metal lead in human health. In some instances the immune system appears to be exquisitely sensitive to the toxic heavy metal lead as compared to other toxicological parameters **(Mishra, 2009).**

Aim of the Work

The aim of this study is to asses the level of blood lead in the children with bronchial asthma and its relation to severity of asthma.

Bronchial asthma

Asthma is a chronic inflammatory condition of the lung airways resulting in episodic airflow obstruction ***(Anderson, 2005).***

It is estimated that as many as 300 million people at all ages, and all ethnic backgrounds suffer from asthma and the burden of this disease to government health care systems, families and patients is increasing world wide **(*Masoli et al., 2004).***

The rate of asthma increases as communities adopt western lifestyle and become urbanized. In Egypt, asthma is the commonest cause of emergency and hospital admission where the prevalence among children aged 3-15 years estimated to be 15-16% ***(Tageldin et al., 2007).***

Asthma becomes a public health problem only in the last 35 years; it was increased dramatically in prevalence and now recognized as a major cause of disability, medical expense and death ***(Beasley et al., 2004).***

Definition:

Asthma is a chronic or recurring inflammatory condition in which the airway develops increased responsiveness to various stimuli, characterized by bronchial hyper-responsiveness, inflammation, increased mucus production, and intermittent airway obstruction.

The symptoms of asthma, which can range from mild to life threatening, can be usually controlled with a combination of drugs and environmental changes. Public attention in the developed world has recently focused on asthma because of its rapidly increasing prevalence, affecting up to one in four urban children (**Martinez et al., 2006).**

Potential risk factors for asthma:

Age:

Asthma prevalence is increased in very young persons and very old persons because of airway responsiveness and lower levels of lung function. The disease starts during the first year of life in at least 30 percent of pediatric patients, in over 50 percent before 2 years of age, and in about 80 percent by the time they reach school age. Approximately half of all children diagnosed with asthma have a decrease or disappearance of symptoms by early adulthood **(Hartert et *al., 2006).***

Race:

Asthma prevalence especially morbidity and mortality, are higher in blacks than in whites. Although genetic factors are of major importance in determining a predisposition to the development of asthma, environmental factors play a greater role than racial factors in the onset of the disease ***(Smith et al., 2007).***

Sex

Asthma predominantly occurs in boys during childhood, with a male -to-female ratio of 2:1 until puberty, when the male-to-female ratio becomes 1:1. Boys are more likely than girls to experience a decrease in symptoms by late adolescence ***(*Smith et al., 2007).**

Males have more severe airway hyper responsiveness; this may be one factor contributing to the higher prevalence of asthma in boys **(Abd El Khalek et al., 2003).**

Epidemiological studies of both incidence and prevalence reported a male predominance of asthma and atopic conditions before puberty and a female predominance after puberty **(Osman, 2003).**

Maternal effects:

Children born from parents with asthma or atopic disorders present an increased risk of developing similar diseases. Maternal factors, placental factors, or both may have an impact on perinatal allergic sensitization **(Arroda et al., 2006).**

Babies born to obese mothers may have an increased risk of asthma **(American Thoracic Society, 2010).**