Hair and Serum Zinc (Zn) Level in a Group of Egyptian Wheezy Infants and its Relation to Disease Severity

Thesis

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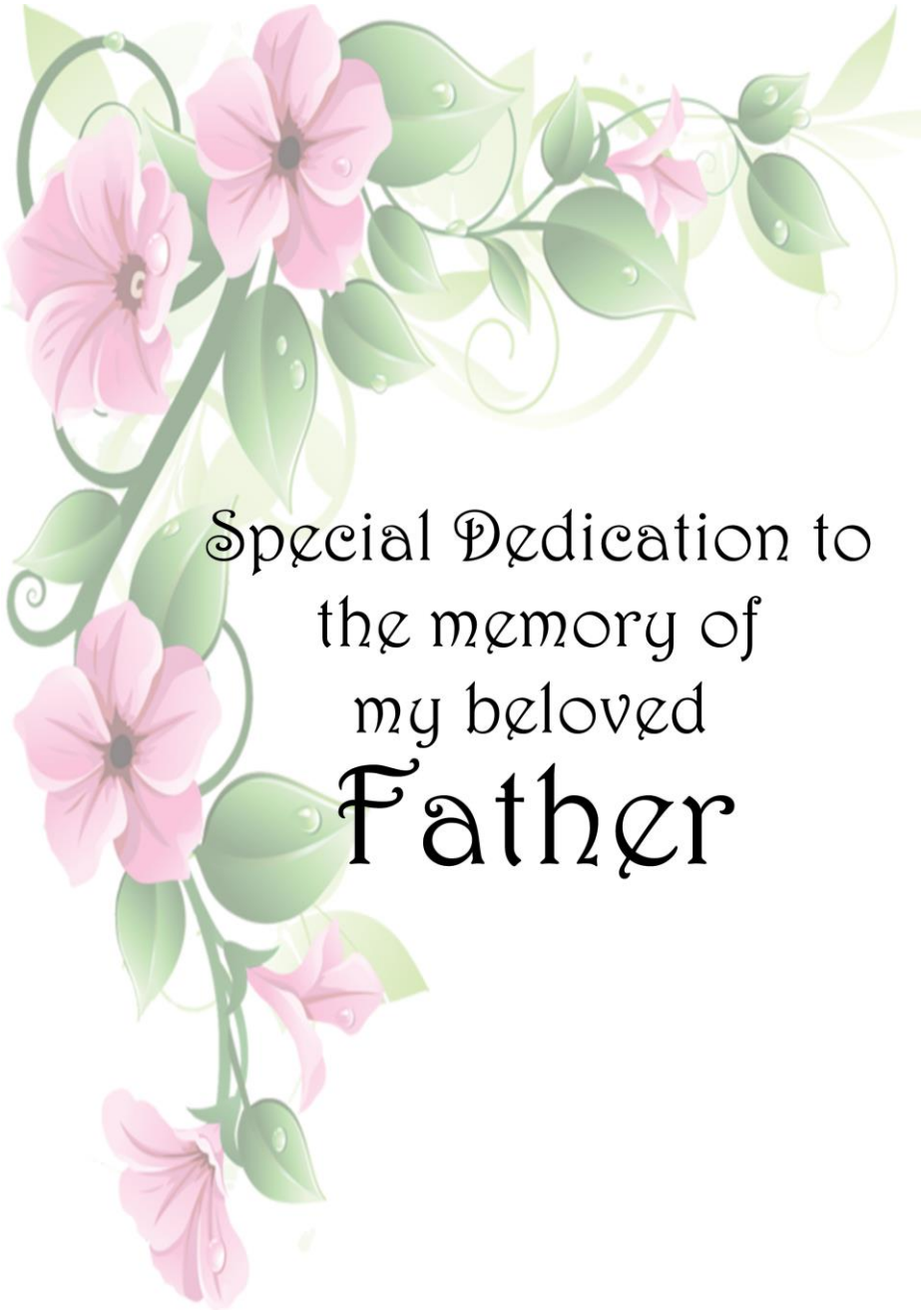

Special Dedication to
the memory of
my beloved
Father

Contents

List of Abbreviations

AAP	:	American academy of pediatrics.
AHI	:	Apnea Hypoapnea Index.
AIA	:	Aspirin induced asthma.
APCs	:	Antigen presenting cells.
API	:	Asthma predictive index.
ARDS	:	Acute respiratory distress syndrome.
AVED	:	Ataxia with vitamin E deficiency.
Bcl2	:	Inner mitochondrial protein.
BPD	:	Broncho-pulmonary dysplasia.
C.pneumoniae	:	Chlamydia pneumoniae.
C.trachomatis	:	Chlamydia trachomatis.
CBC	:	Complete blood picture.
CCL5	:	Chemokine (C-C motif) ligand 5.
CCR5	:	Chemokine receptor 5.
CD14	:	Cluster of differentiation 14.
CMT1	:	Copper membrane transporter1.
COPD	:	Chronic obstructive pulmonary disease.
CPAP	:	Continuous positive airway pressure.
CVA	:	Cough variant asthma.
ECG	:	Electrocardiogram.
ECM	:	Extracellular membrane.
EIA	:	Exercise induced asthma.
EISL	:	Estudio Internacional de Sibilancias en Lac – tants (International Study of wheezing in infants.
EPR	:	Expert panel report.
ERS	:	Europear respiratory society.
EVW	:	Episodic viral wheeze.
FVE1	:	Forced expiratory volume in the first second.
GERD	:	Gastro-oesophageal reflux disease.
H.influenza	:	Hemophilus influenza.
HIV	:	Human immunodeficiency virus.

List of Abbreviations (Cont.)

HRV	:	Human rhino virus.
ICS	:	Inhaled corticosteroids.
ICU	:	Intensive care unit.
IFN-γ	:	Interferone γ.
IgE	:	Immuno-globulin E.
IL	:	Interleukin.
ISAAC:		International Study of Asthma and Allergy in Childhood.
JACI	:	The Journal of Allergy and Clinical Immunology.
LABA	:	Long acting B2 agonist.
LDLs	:	Low denisty lipoproteins.
LPS	:	Lipopolysaccharides.
LRTI	:	Lower respiratory tract infection.
LTRA	:	Leukotriene receptor antagonist.
M.cattarrhalis	:	Moraxella cattarrhalis.
mAPI	:	Modified asthma predictive index.
MT	:	Membrane type metalloproteinase.
NF Kappa B:		Nuclear factor kappa-light-chain-enhancer of activated B cells.
NK	:	Natural killer
1,25(OH)2D:		1, 25-di-hydroxyvitamin D.
25OHD	:	25-hydroxyvitamin D.
OSA	:	Obstructive sleep apnea.
OSAS	:	Obstructive sleep apnea syndrome.
PBW	:	Post bronchiolitis wheeze.
PCR	:	Polymerase chain reaction.
PICU	:	Pediatrics intensive care unit.
RA	:	Retinoic acid.
RBP	:	Retinol binding protein.
RCT	:	Randomized control trial.
RDAs	:	Recommended dietry allowance.

List of Abbreviations (Cont.)

RDS	:	Respiratory distress syndrome.
REM	:	Rapid eye movement phase of sleep.
ROS	:	Reactive oxygen species.
RPE	:	Retinal binding epithelium.
RSV	:	Respiratory syncytial virus.
S.pneumoniae	:	Streptococcus pneumoniae.
SABA	:	Short acting B2 agonist.
SDB	:	Sleep disordered breathing.
Se	:	Selenium.
SIGN	:	Scottish Intercollegiate Guidelines Network.
SMC	:	Smooth muscle cell.
SPAG2	:	Small Particle Aerosol Generator Model2.
TGFB1	:	Transforming growth factor-β1.
Th	:	Helper T cell.
TLR	:	Toll like receptor.
TNF	:	Tumor necrosis factor.
Treg	:	Regulatory T cell.
uLTE4	:	Urinary leukotriene E4.
URT	:	Upper respiratory tract .
UV	:	Ultra violet.
VDR	:	Vitamin D receptor.
ZIP	:	Gene family works as metal transporter protein.
Zn	:	Zinc.
ZnT	:	Zinc Transporter.
α-TTP	:	α-tocopherol transfer protein.

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Introduction

Infantile wheezing, which includes viral associated wheeze and asthma, are amongst the most common reasons for children to present urgently to a doctor ***(Saglani and Bush, 2007).***

Many children exhibit symptoms of bronchial obstruction before they are 5 years, especially wheezing and coughing. The results of cohort studies show a great deal of variation and indicate that between 10 and 80.3% of infants suffer at least one episode of wheezing during their first year of life, while 8 to 43.1% have three or more episodes, with lower prevalence rates in developed countries ***(Mallol etal.,2005)***.

Respiratory viruses, such as syncytial respiratory virus, rhinovirus, metapneumovirus, parainfluenza type 3 and influenza are associated with increased risk of wheezing among preschool children. In low income populations, pneumonia has been associated with recurrent wheezing.The risk of developing wheezing at the start of life is greater among male infants, children who attend daycare, children exposed to cigarette smoke and children in contact with high levels of endotoxins and allergens in room air, such as those produced by mites, cockroaches and animal hair. The International Study of Wheezing in Infants (EISL) was born of the need to trace the epidemiology of wheezing among infants ***(Chong Neto and Rosário, 2010).***

A proposed mechanism related changes in dietary antioxidant intake to reduced lung antioxidant defenses, with increased airway susceptibility to oxidant damage resulting in airway inflammation and asthma ***(Devereux and Seaton, 2005).***

Trace elements play an important role in various physiological processes, and are crucial for proper functioning of the immune system ***(EL-sayed and Aamer, 2013).***

Deficiency of trace elements and infectious diseases are often concomitantly observed and result in complex interactions ***(Lukac and Massanji, 2007).***

The major trace elements such as zinc, selenium, copper, and magnesium have Immune modulatory effects and thus influence susceptibility and the course of a variety of infections ***(EL-sayed and Aamer, 2013).***

This is mainly due to the fact that these elements are part of the structure of antioxidant enzymes. These enzymes act as antioxidant defense and are able to regulate the host immune system, and alter viral genome ***(Lukac and Massanji, 2007).***

The dietary Zinc (Zn) plays essential roles in cellular metabolism and gene expression ***(Murgia et al., 2006).***

Zinc deficiency results in enhanced oxidative damage in the airways by causing infiltration of inflammatory cells and increased superoxide and nitric oxide production.

When zinc deficiency occurs in conjunction with acute lung injury or asthma, a more intense inflammation is produced ***(Zalewski, 2006).***

Zinc deficiency has been linked to a group of respiratory disorders including pneumonia ***(Brooks et al., 2004)*** cystic fibrosis ***(Tudor et al., 2005)*** and asthma ***(Riccioni and D'Orazio, 2005).***