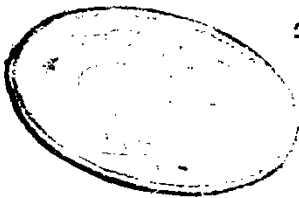


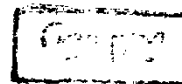
**EFFECT OF ACUTE RESPIRATORY INFECTIONS
ON BLOOD ZINC COPPER AND VANADIUM
IN CHILDREN**

THESIS

Submitted in Partial Fulfillment
For the Master Degree



BY **HANEM AHMED EL-NADI**
M. B. B. CH.
(PAEDIATRICS)
IN
AR/9/01
بوسه



618.922
H. A

20522

Supervisors

Dr. RABAH M. SHAWKY
Assistant, Prof. of Pediatrics
Faculty of Medicine
Ain Shams University

Prof. Dr. ALY A. MASSOUD
Prof. and Chairman of the
Department of Community,
Environmental and Occupational
Medicine, Faculty of Medicine
Ain Shams University

Dr. AHMED HUSSEIN ABD EL-KARIM
Assistant Prof. of Occupational Health
National Research Center.

1983

ACKNOWLEDGMENT

It is my great pleasure to express my sincere thanks and deep gratitude to Dr. Rabah Mohamed Shawk, Assistant Professor of Pediatrics, Faculty of Medicine, Ain-Shams University, for her suggestion and planning of this work, for her guidance, continuous advice and encouragement during her supervision of this work.

I am so grateful to professor Dr. Aly Abdel Hadi

Masoud, Chairman and Professor, of Community, Environmental and occupational Medicine, Ain Shams University, for the kind guidance, sincere advice, and for his keen supervision

I would like also to express my deepest thanks

and gratitude to Dr. Ahmed Abdel Karim Assistant Professor of Occupational Health in National Research Center

I will remain always remembering his excellent supervis-

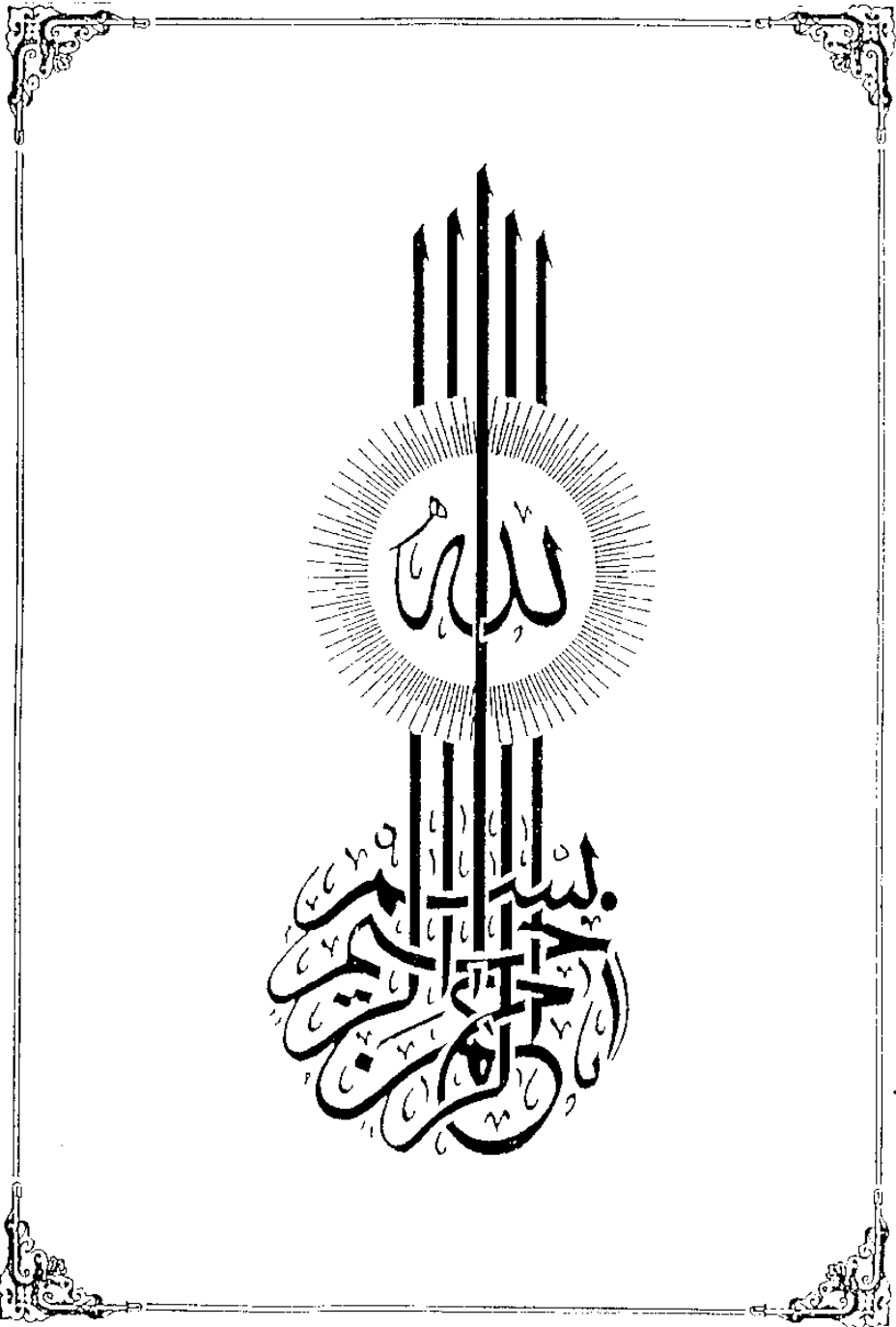
ion, his helpful criticism and highly appreciated efforts.

I wish to record my gratitude to every member who

co-operated with me to fulfill this study, wishing to all

best luck.

Hanem Ahmed El Nadi



CONTENTS

Page

I) INTRODUCTION AND AIM OF WORK	1
II) REVIEW OF LITERATURE	4
1- Acute Respiratory Infection	4
1. Upper respiratory tract infection	4
2. Acute infections of the larynx and trachea	6
3. Acute bronchitis	8
4. Acute bronchiolitis	10
5. Pneumonia	13
2- Zinc	29
A. Biological role of zinc	29
B. Distribution of zinc	30
C. Metabolism of zinc	31
D. Zinc in the blood	34
E. Zinc requirements	35
F. Deficiency of zinc	36
G. Clinical aspects of zinc deficiency	37
H. Zinc toxicity	38
3- Copper	39
a) Biological role	39
b) Distribution of copper in body tissues	40
and fluids	40
c) Metabolism	42

47	d) Copper in the blood
48	e) Requirements
50	f) Deficiency of copper
51	g) Clinical aspects of copper deficiency..
52	h) Toxicity of copper
54	4- Vanadium
54	A) Biological role of vanadium
56	B) Distribution
56	C) Metabolism
57	D) Requirements
57	E) Deficiency
59	F) Toxicity
61	III) MATERIAL AND METHODS
69	IV) RESULTS
77	V) DISCUSSION
84	VI) SUMMARY
87	VII) REFERENCES
	VIII) ARABIC SUMMARY.

INTRODUCTION AND AIM OF WORK

I. INTRODUCTION AND AIM OF THE WORK

Zinc is involved in nearly all aspects of cellular metabolism (Vallée, 1959). It is an essential constituent of nearly 70 metallo-enzymes that participate in both anabolism and catabolism of proteins and nucleic acids. As a consequence, it is indispensable to cellular function and division (Idem, 1977). Nearly all serum zinc is present bound to various proteins (Parisi and Vallée, 1970).

Although copper is present in much less amounts than those of zinc, yet it is equally essential to life. It is present in many enzyme systems especially those concerned with oxidative metabolism and functions with iron in the formation of haemoglobin (McElroy and Galt, 1950). It is found in 2 fractions of human serum, loosely bound in albumin and more firmly attached in ceruloplasmin (Shields et al., 1960). In red cells it is found as a component of erythrocyte protein in a labile form.

Vanadium is an essential trace element for plant growth and can to some extent reduce the effects of iron and animal metabolism. In small quantities it stimulates

The aim of the present work, is to study changes which occur in plasma zinc, copper and vanadium during acute respiratory infections in children and to see

Aim of the work:-

(Williams and Phelan 1975).

under 5 years and 30 % in children between 5 and 12 years

in childhood comprising 50% of all illnesses in children
Acute respiratory infections are the commonest illnesses
that might have an effect on their trace metal level.
Infection in children is the most frequent stress state
have been reported in stress states (Oleske et al., 1974).
vanadium are quite constant. However striking changes
Under normal circumstances plasma zinc, copper and

(Michael et al., 1981).

control over vanadium. It does not accumulate with age

(Schroeder et al., 1963). The body exerts homeostatic

ting vanadium is not specifically bound to proteins
in plasma is higher than in lean tissues and circula-
oxidative capacity (Bernheim, 1939). The concentration
it has certain biological functions by virtue of its
deficiency (Strasia 1971). It has been suggested that

If these changes can be used as an index of the severity of the disease and thus be of potential prognostic value.

REVIEW OF LITERATURE

II. REVIEW OF LITERATURE

1- Acute Respiratory Infections

Acute respiratory infections are the commonest illnesses in childhood comprising approximately 50% of all illnesses in children under 5 years, and 30% in children between 5 and 12 years. (Williams and Phelan 1975).

Classification

There are 5 main clinical categories:

- 1- Upper respiratory infection.
- 2- Acute infections of the larynx and trachea.
- 3- Acute bronchitis.
- 4- Acute bronchiolitis.
- 5- Pneumonia.

1- Upper respiratory tract infection:-

Are those primarily affecting the structures of the respiratory tract above the larynx and includes:

(a) Colds:

These are illnesses whose main features are watery, mucoid or purulent nasal discharge associated with nasal obstruction. Severe cold is associated with moderate pyrexia and some constitutional disturbance.

toms.

requently there may be other associated respiratory symptoms, and constitutional symptoms are common, and fever, and may be perforated with a purulent discharge. Barache, the middle ear, the drum being swollen and hyperemic, This is characterised by an acute inflammation in

(d) Otitis Media:

is often predominant in one. inflammation frequently involves both structures, but as the tonsils and pharynx are intimately related,

and enlargement of the cervical lymph nodes. invariably present and there may be some tenderness fever and constitutional disturbances are almost are red and swollen and frequently show exudate - This is a localised infection of the tonsils which

(c) Tonsillitis:

and some constitutional disturbances. a cold. This illness is usually associated with fever any localization in the tonsils and without signs of This is an acute inflammation of the pharynx without

(b) Pharyngitis:

2- Acute infections of the larynx and trachea:
(a) Laryngo - Tracheobronchitis:

This is the most common of croup. It usually occurs in children between 6 months and 3 years of age. It is thought to be a viral disease. The viruses involve mainly the subglottic area (Larynx, trachea, and bronchi). Symptoms may vary depending upon which anatomic area is more heavily infected.

Clinical Findings:-

A) Symptoms and signs: The onset is usually gradual, with a history of several days of upper respiratory tract symptoms prior to the onset of barking cough and stridor. Fever is generally mild. If the lower respiratory tract involved, wheezing may be present. As the laryngeal obstruction progresses, stridor becomes associated with sternal, subcostal, and abdominal retractions and the expiratory phase of respiration is prolonged. Auscultation reveals decreased breath sounds. The child becomes anxious and restless as hypoxemia ensues. Cyanosis is a late sign and may herald complete obstruction.

B) Laboratory findings: The white count seldom rises above 15,000/cu mm.

Complications: The principal complication of viral croup is asphyxia secondary to laryngeal obstruction.

Prognosis: Most children do not progress beyond the stage of cough, stridor, and mild retractions, and the disease runs its course in 3-7 days with gradual improvement leading to complete recovery (Singer et al., 1976).

(b) Epiglottitis:

This form of croup generally affects children between ages 3-7 years. It has a rapidly progressive fulminant course. It is most commonly caused by Haemophilus influenza type B.

Clinical findings:-

A. Symptoms and signs: The onset is abrupt. Younger children often present with high fever and respiratory distress, older children complain of difficulty in swallowing and severe sore throat. Because of the extreme dysphagia, pooling of

secretions in the pharynx and drooling are prominent signs. The larynx is not involved.

Phonation is muffled, but voice quality is

normal. Fever is usually high ($> 38.5^{\circ}$). Within

hours after onset, the child may be in marked

respiratory distress, with stridor and retractions

The pharynx is inflamed (cherry-red) and excessive

salivaceous secretions may be noted. The diagnosis can

be made by visualizing the large, swollen, cherry-

red epiglottitis.

B. Laboratory findings: Leucocytosis of more than

15,000/cu mm. is usually present.

Prognosis: The disease process usually responds rapidly to antibiotics. Mortality rate may be as high as

50% (Molteni 1976).

3- Acute Bronchitis:

Acute bronchitis as an isolated clinical entity is uncommon in childhood, but it may be associated with a number of other conditions of the upper and lower respiratory tracts.