Iron Supplementation Outcome on Recurrent Upper Respiratory Tract Infections in 6-15 Years Old Egyptian Children
A 1 Year Prospective Study

Thesis

Submitted for Partial Fulfillment of MD Degree in Pediatrics

By

Marian Girgis Rizk

M.B.B.Ch. (2005), M.Sc Pediatrics

Faculty of Medicine- Ain Shams University

Under Supervision of

Prof. Dr. Mohsen Saleh El-Alfy

Professor of Pediatrics

Faculty of Medicine- Ain Shams University

Prof. Dr. Ehab Khairy Emam

Professor of Pediatrics

Faculty of Medicine- Ain Shams University

Dr. Khaled Mahmoud Abd El- Aziz

Assistant Professor of Public Health & Community

Faculty of Medicine- Ain Shams University

Dr. Mohamed Tarif Mohamed Hamza

Lecturer of Clinical Pathology

Faculty of Medicine- Ain Shams University

Dr. Yasmin Gamal El-Gendy

Lecturer of Pediatrics

Faculty of Medicine, Ain Shams University

Faculty of Medicine

Ain Shams University

2015

Acknowledgment

First of all, my deepest and greatest gratitude and thanks to ALLAH *for helping and supporting me to present this modest work.*

In fact, I can't find meaningful words to express my extreme thankfulness, profound gratitude and deep appreciations to my eminent **Prof. Dr. Mohsen Saleh El-Alfy,** *Professor of Pediatrics Faculty of Medicine- Ain Shams University for his majestic generous help, guidance, kind encouragement and great fruitful advice during supervision of this work.*

Also I'm deeply grateful to **Prof. Dr. Ehab Khairy Emam,** *Professor of Pediatrics Faculty of Medicine- Ain Shams University for his valuable help, assistance, encouragement and supporting me through devoting his time to facilitate the production of this work.*

And special thanks to **Dr. Khaled Mahmoud Abd El-Aziz,** *Assistant Professor of Public Health & Community, Faculty of Medicine- Ain Shams University for his great, great efforts, unlimited experience and support throughout this work.*

I extend also my deepest thanks and appreciation to **Dr. Yasmin Gamal El-Gendy**, *Lecturer of Pediatrics, Faculty of Medicine, Ain Shams University, for her great efforts and support during the whole work.*

I can't forget to thank **Dr. Mohamed Tarif Mohamed Hamza,** *Lecturer of Clinical Pathology, Faculty of Medicine, Ain Shams University, for his encouragement and help in this study.*

Finally, I would like to express my deepest thankfulness to my ***Family special my parents, my husband*** for *their great help and support whom without I could do nothing.*

Marian Girgis Rizk

Abstract

Background: Iron therapy could reduce the prevalence of upper respiratory infections. **Aim:** To assess the incidence and type of recurrent URTIs in Egyptian school children, assessing the prevalence of iron deficiency anemia and the effect of iron supplementation on the incidence and severity of URTIs among them. **Patients and Methods:** 1000 Children (6–15 years) were recruited for a prospective interventional study from two schools in Shobra, Cairo, Egypt, enrollment was done in early autumn and after a three months follow up, students whom diagnosed to have recurrent URTIs were screened by Hemocue; if anemic (Hb < 11.5gm/dL): CBC and iron profile were done, they enrolled into 3 groups: (A) had iron deficiency anemia and received oral iron fumerate therapy (6mg/kg/d) for 3 months then maintained on oral iron (1mg/kg/d) for one year, and (B) non anemic randomly assigned in 1:1 ratio into: group (B1) received maintenance iron therapy for one year and group (B2) did not receive iron. Frequency and severity of URTIs using (CARIFS score) throughout the study period were recorded. **Results:** Tow-hundred and forty (24.5%) of the children were suffering from recurrent URTIS during autumn, 135 of them (55%) was anemic. The frequency of iron deficiency anemia among children who experienced recurrent URTIS was 42.8%. The most prevalent upper respiratory tract infection was common cold (60%) followed by acute tonsillitis (29%). A maintenance dose of iron decreased the frequency and severity of URTIS. **Conclusion:** Iron deficiency anemia caused a higher number of URTIs and correcting it improved the number of illness.

Key words: Iron, URTIs, CARIFS.

Table of Contents

List of Abbreviations

Abb.	Mean
AOM	Acute otitis media
BMI	Body mass index
C3	Complemnt 3
C4	Complement4
CARIFS	Canadian acute respiratory illness and flu scale
CBC	Complete blood count
CRP	C-reactive protein
CSOM	Chronic suppurative otitis media
ELISA	Enzyme linked immuno assay
ENT	Ear-nose-throat
ESR	Erythrocyte sedimentation rate
Hb	Hemoglobin
HFE	High iron fe
ID	Iron deficiency
IDA	Iron deficiency anemia
IDDM	Insulin dependent diabetes mellitus
Ig	Immunoglobulin
IL	Interleukin
INF	Interferon
IREG-1	The iron regulated transporter-1
IRP/IRE	The iron regulatory protein/the iron responsive element
MCH	Mean corpuscular hemoglobin
MCV	Mean corpuscular volume
NA^2 EDTA	Disodium ethylenediamine tetraacetic acid
NADH	Nicotinamide adenine dinucleotide
NK	Natural killer

Abb.	Mean
OME	Otitis media with effusion
PCR	Polymerase chain reaction
RBCs	Red blood cells
RRIs	Recurrent respiratory infections
RRIs	Recurrent respiratory infections
RURTIs	Recurrent upper respiratory tract infections
SF	Serum ferritin
TIBC	Total iron binding capacity
TNF	Tumor necrosis factor
UK	United kingdom
URTIs	Upper respiratory tract infections
WBCs	White blood cells
WHO	World health orginaization

List of Tables

List of Figures

Abstract

Background: Recurrent upper respiratory infections (RURTIs) are common in school age children. An adequate iron status might reduce their prevalence. **Aim**: To assess the percentage and type of RURTIs in Egyptian school children, assessing the percentage of iron deficiency anemia (IDA) and the outcome of iron supplementation on the recurrence and severity of URTIs among them. Patients and Methods: One thousand Children (6–15 years) were recruited from two schools in Shobra, Cairo; enrollment was done in early autumn for three months; students whom defined to have RURTIs were screened by Hemocue; if anemic (Hb < 11.5gm/dL): CBC and iron profile were done, they were enrolled into 2 groups: (A) Had IDA and received oral iron fumerate therapy (6mg/kg/d) for 3 months, then maintained on oral iron (1mg/kg/d) for 9 months, and (B) Non anemic; were randomly assigned in 1:1 ratio into: group (B1) Received maintenance iron therapy same dose for 12 months and group (B2) Did not receive iron. Recurrence and severity of URTIs using (CARIFS score) throughout the study period were recorded. **Results:** Two-hundred and forty-five (24.5%) of the children were suffering from recurrent URTIs during autumn, 135 of them (55%) were anemic. The percentage of iron deficiency anemia among children who experienced recurrent URTIs was 42.8%. The most prevalent upper respiratory tract infection was common cold (60%) followed by acute tonsillitis (29%). A maintenance dosage of iron decreased the recurrence and severity of URTIs. **Conclusion:** Recurrent URTIs were common in 6-15 years old Egyptian students, iron deficiency anemia was prevalent among them. Iron therapy was advantageous to lower the occurrence of URTIs of the studied population during the follow-up.

Key words: Iron, RURTIs, CARIFS.