بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

The role of Zinc supplementation as anti-inflammatory in prevalent Hemodialysis patients

Thesis

Submitted for partial fulfillment of Master degree
in Internal Medicine

By

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2020

Acknowledgments

First and foremost, I feel always indebted to **Allah,** *the* ***Most Beneficent*** *and* ***Merciful,*** *Who gave me the strength to accomplish this work.*

My deepest gratitude to ***Prof. Dr. Eman Ibrahiem Sarhan,*** *Professor of Internal Medicine and Nephrology, Faculty of Medicine, Ain shams University, for her valuable guidance and expert supervision, in addition to her great deal of support and encouragement. I really have the honor to complete this work under her supervision.*

I would like to express my great and deep appreciation and thanks to ***Dr. Mohamed Saeed Hassan,*** *Lecturer of Internal Medicine and Nephrology, Faculty of Medicine, Ain shams University, for his meticulous supervision, and his patience in reviewing and correcting this work.*

I can't forget to thank with all appreciation ***Dr. Moustafa Abdelnassier Abdelgawad,*** *Lecturer of Internal Medicine and Nephrology, Faculty of Medicine, Ain shams University, for the efforts and time he has devoted to accomplish this work.*

Special thanks to my **Parents,** *my* **Husband** *and all my* **Family** *members for their continuous encouragement, enduring me and standing by me.*

Elham Atitallah Mansour

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List of Abbreviations

Abbr.	Full-term
Cd	Cadmium
CD	Cluster of differentiation
DCs	Dendritic cells
EEA	Early endosome antigen
ESRD	End stage renal disease
FOXP3	Forkhead box p3
Hg	Mercury
HSCRP	High sensitive proteins
IFN	Interferon
IGE	Immunoglobulin E
IL	Interleukin
LPS	Lipopolysaccharide
MHC	Major histocompatibility complex
MMPS	Matrix metalloproteinase
MT	metallothioneine
NAPDH	Nicotinamide adenine dinucleotide phosphate
NF.KB	Nuclear transections factor
NK	Natural killer
NO	Nitric oxide
PI3K	Phospholipid phosphatidylinositol 3 phosphate
PMNS	Polymorph nuclear neutrophils
RA	Rheumatoid arthritis
ROS	Reactive oxygen species
SOD	Superoxide dismutase
STST	Special tertiary admission test
VSMC	Vascular smooth muscles cells
WHO	World health organization
ZIP4	Zinc transporter precursor
Zn	Zinc
ZnT1	Zinc transporter

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Abstract

Background: Zinc is an essential micronutrient for human beings and its deficiency affects their normal growth and development. Although the prevalence of zinc deficiency is still unclear in patients with maintenance hemodialysis (MHD), some data show adverse outcomes that may attribute to zinc deficiency. **Aim of the Work:** to assess if zinc supplementation has a role in decreasing the inflammatory markers levels in hemodialysis patients with zinc deficiency; 60 patients (20 healthy people as control – 40 patients ESRD on regular hemodialysis). **Patients and Methods:** A cohort prospective interventional study was conducted on 60 patients (20 healthy people as control – 40 patients ESRD on regular hemodialysis) at Dialysis unit of Ain Shams University during a period of 6 months. **Results** that zinc level was significantly lower in ESRD (8.33) umol/l compared to the healthy control group (13.33)umol/l (normal level of zinc 12.5-18.5 umol/l the inflammatory markers were significantly higher in ESRD who had zinc deficiency HSCRP (9565.7)mg/l , IL6 (57.8) pg/ml compared to the ESRD patients who had normal zinc After zinc supplementations to ESRD patients who had zinc deficiency we found that The zinc level increased significantly from (7. 1± 1.1)umol/l to (14.3± 1.8)umol/ l . inflammatory markers level was significantly decreased, HS CRP Level from (9565.7 ± 259307)mg/l to (4708 ± 2235.4) mg/l , IL6 level from (57.8 ± 16.5)pg/ml to (28.0 ± 9.1)pg/ml **Conclusion:** Zinc deficiency in ESRD on regular hemodialysis is more than in normal population which increase the inflammation response and, high HSCRP and IL6 as a inflammatory markers, after correction of zinc deficiency in ESRD, the inflammatory markers is decreased and the inflammations is improved , and has a positive effect to Hb and Ca.

Key words: zinc supplementation, inflammatory markers, hemodialysis, deficiency, ESRD

Introduction

Zinc (Zn) nutritional importance has been known for a long time, but in the last decades its importance in immune modulation has arisen. This review aims at describing the mechanisms involved in the regulation of Zn homeostasis and their effects on the immune response focusing on those which are implicated in the physiopathology of rheumatoid arthritis. Zn functions as a modulator of the immune response through its availability, which is tightly regulated by several transporters and regulators ***(Lönnerdal, 2000).***

When this mechanism is disturbed, Zn availability is reduced, altering survival, proliferation and differentiation of the cells of different organs and systems and, in particular, cells of the immune system. Zn deficiency affects cells involved in both innate and adaptive immunity at the survival, proliferation and maturation levels. These cells include monocytes, polymorphonuclear-, natural killer-, T-, and B-cells ***(Maywald et al., 2017).***

T cell functions and the balance between the different T helper cell subsets are particularly susceptible to changes in Zn status. While acute Zn deficiency causes a decrease in innate and adaptive immunity, chronic deficiency increases inflammation. During chronic deficiency, the production of pro-inflammatory cytokines increases, influencing the outcome of a large number of inflammatory diseases, including rheumatoid arthritis ***(Domellöf et al., 2009).***

The 24th most abundant element in the earth's crust, zinc (Zn), is a metallic chemical element, which has "exceptional biologic and public health importance". Zn is referred to as a trace element with a minor plasma pool (13.8–22.9 μmol/L) and a rapid turnover. Because of the absence of specialized Zn storage in the body, a Zn daily intake (20– 40% of daily intake depending on diet) is required to achieve the steady-state, maintain it and support all its functions ***(Shankar and Prasad, 1998).***

Zn is involved in numerous aspects of cellular metabolism and is an integral component of proteins involved in cell structures and stabilization of cell membranes ***(Maret, 2017).***

It plays a role in cellular respiration (carbonic anhydrase), immune functions, protein synthesis, wound healing, DNA synthesis, and cell division. For these reasons, Zn nutritional defect or over-absorption is linked to a large number of diseases and particularly to immune diseases ***(Prasad, 1998).***

Aim of the Work

This study assessed if zinc supplementation has a role in decreasing the inflammatory markers levels in hemodialysis patients with zinc deficiency.