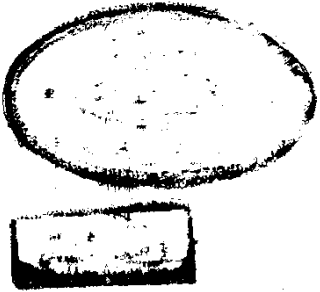


# **ZINC IN RELATION TO MALE INFERTILITY**

**Thesis**

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of the Master Degree in  
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**By**

**Ahmed Mohamed Abdel-Aziz  
M.B., B.Ch.**

**UNDER SUPERVISION OF**

***Prof. Dr. Saleh El-Shiemy***

**Prof. of Dermatology & Venereology**

***Dr. Moustafa Mokhtar Kamel***

**Lec. of Dermatology & Venereology**

**FACULTY OF MEDICINE**

**AIN SHAMS UNIVERSITY**

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**INTRODUCTION  
AND AIM OF THE WORK**

## INTRODUCTION AND AIM OF THE WORK

Zinc is a metallic element, its symbol is Zn, atomic no. 30, atomic weight 65.4. The metal is a normal constituent of the earth's crust and is widely distributed among various types of foods especially those of animal origin. It has long been known to be an essential element for the growth and well-being of both man and animal. It plays an important role in testicular and prostatic functions. The metal is found in extremely high concentrations in the prostate and seminal fluid and it can influence many functional properties of the spermatozoa.

Zinc deficiency is known to cause various systemic manifestations as well as it can induce adverse effects on male reproductive system functions in particular. On the contrary, zinc administration has beneficial effects in the therapy of certain infertile patients either alone or in combination with other medicaments.

The aim of this thesis is to review the various aspects concerning zinc as regards its metabolism, secretion in the seminal fluid and factors involved, effect on spermatozoal functional properties, role in testicular functions and its relation to certain fertility disorders.



# **REVIEW OF LITERATURE**

# **ZINC REQUIREMENTS AND METABOLISM IN THE BODY**

## ZINC REQUIREMENTS AND METABOLISM IN THE BODY

### Zinc in Nature:

Zinc has been estimated to rank 25th in abundance. It makes up 0.004 to 0.01% of the earth's crust (Vallee, 1959). As an inorganic element, zinc is not destroyed but remains in cycle. This cycle in its simplest form is from the rock (soil) to plants to animals and again to soil or ocean. However there is a net loss of elemental zinc from the soil due to natural leaching and erosion and also because sewage is directed toward the ocean. (Halsted et al, 1974).

### Chemistry of Zinc:

Zinc has an atomic number of 30 and an atomic weight of 65.4. It has a relatively low melting point. Fifteen isotopes of zinc have been described ranging from  $\text{Zn}^{60}$  to  $\text{Zn}^{72}$ . Ten of these isotopes are not stable. Metallic zinc is a good reducing agent, is amphoteric and dissolves in mineral acids and strong bases. Zinc exists in solution only in

the oxidized state of  $\text{Zn}^{2+}$ . The soluble salts of zinc include chloride, bromide, iodide, formate, acetate, sulfate and nitrate. The insoluble salts include carbonate, sulfide, hydroxide, ammonium, phosphate, oxalate and phytate. (Hicks, 1960).

### Zinc in Food:

It was observed that foodstuffs of animal origin, including dairy products and sea foods are good dietary zinc sources. Excessive amounts may be found in oysters, legumes, nuts, whole grain and green leafy vegetables are important zinc sources, whereas most fruits contain insignificant amounts of the metal (Freeland and Cousins, 1976). Beverages, beer, wines and spirits contain minute concentrations of zinc. There is a positive correlation between the contents of zinc and proteins in foodstuffs. The zinc: nitrogen ratio has been estimated to average 1 : 1000 (Osis et al, 1972).

Classes of foods can not be rigidly categorized according to zinc concentration because of the variability of the zinc contents of foods within each class, resulting from the difference in analysis, source and variety (Halsted et al, 1974). The following table is an approximation of the zinc content of several selected foods.

Table (1): to show zinc contents of selected foods  
from (Osis et al, 1972)

Food item		Zinc mg/100gm (wet weight)
Meat products	Roast beef	6.4
	Beef patty(raw)	4.7
	Chicken breast	1.1
	Chicken thigh	2.8
Dairy products	Milk	0.34
	Cream(half & half)	0.40
Breads	White	0.57
	Rye	1.34
	Whole wheat	1.04
Vegetables and Fruits		
	Peas	0.69
	Potatoes	0.29
	Green beans	0.21
	Carrots	0.25
	Tomatoes	0.20
	Apricots	0.12
	Peaches	0.07
	Pears	0.08
	Apple sauce	0.08
	Orange juice	0.11
	Apple juice	0.07
	Grape fruit juice	0.10
Beverages	Tea	0.02
	coffee	0.03
	Decaf coffee	0.04

Dietary allowances for zinc

The recommended dietary allowances for zinc are shown in the following table.

Table (2) to show the recommended dietary allowances for zinc. From (National Academy of Sciences, 1980).

Group	Age(in years)	Zinc intake (mg/day)
Infants	0.0 - 0.5	3
	0.5 - 1.0	5
Children	1 - 10	10
Adults	11 +	15
Pregnant women		20
Lactating women		25