

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

﴿فَلَا تَعْلَمُ نَفْسٌ مَّا أُخْفِيَ لَهُم مِّن قُرَّةِ أَعْيُنٍ  
جَزَاءً بِمَا كَانُوا يَعْمَلُونَ﴾

صِدْقَةُ اللَّهِ الْعَظِيمَةِ





*Evaluation of Some Trace Elements and  
Antioxidants Levels in Sera of Patients with  
Rheumatoid Arthritis*

ROAA MOHAMMED KHADIM

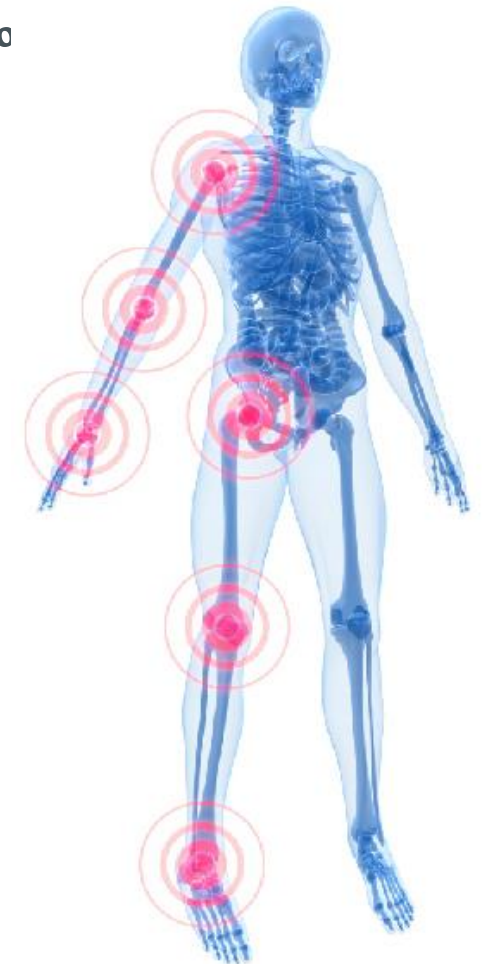
SUPERVISED BY:

DR. FALAH S. AL-FARTUSIE

A decorative graphic featuring a dark blue horizontal banner with the word "Introduction" in white, bold, sans-serif font. The banner is flanked by three lightbulb icons in white squares above and below it. The banner is also decorated with three vertical lines on the left and right sides, resembling a binder or folder edge.

# Introduction

- **Rheumatoid arthritis (RA) is a chronic autoimmune systematic inflammatory disease with a destructive pattern to the joints. It is caused by severe inflammation of the immune cellular reactions in the synovial lining tissue of the joints and the interaction of the immune complex in the synovial fluid.**
- **It affects the small joints of the fingers, hands, wrists, knees, shoulders , feet , elbows, hips and neck.**
- **Chronic inflammation causes pain ,swollen, and stiffness in the joints affecting the movement by limiting the range of motion.**

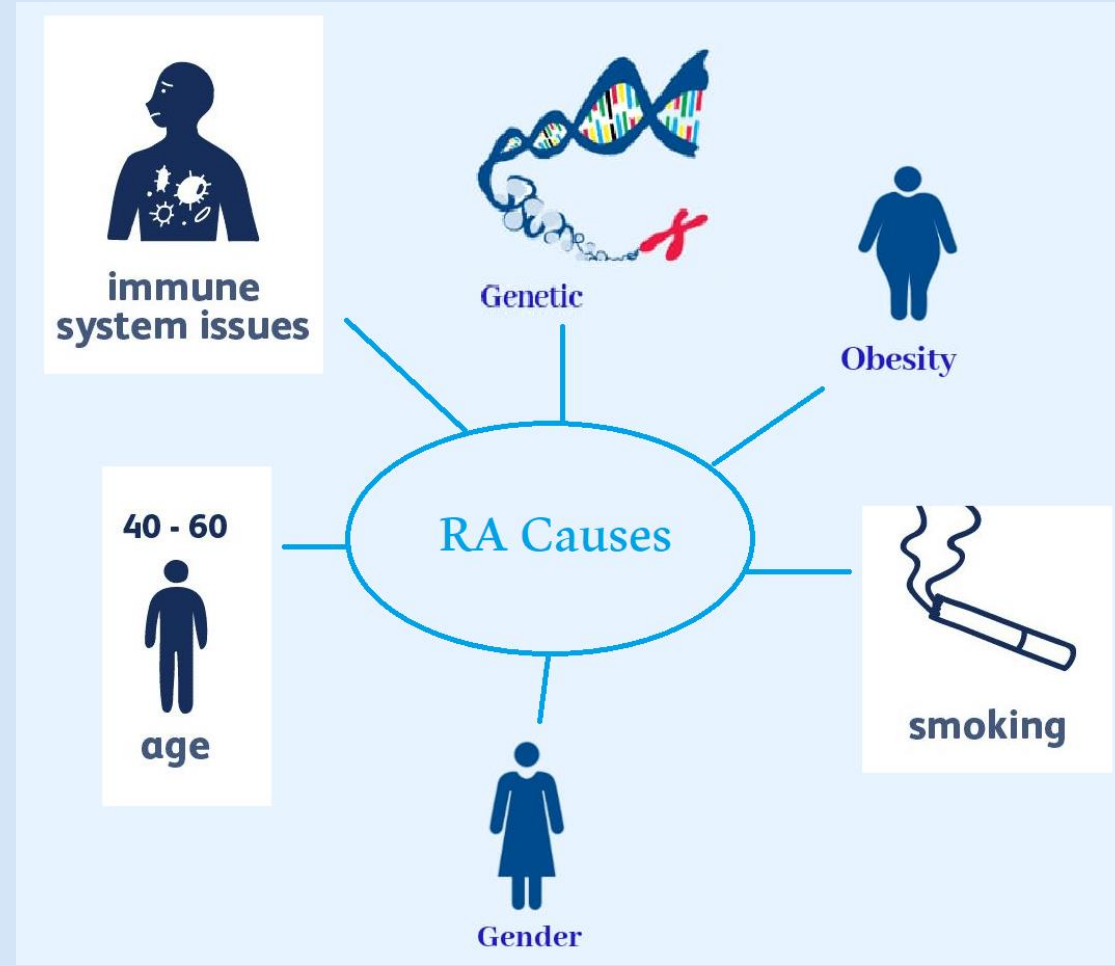


➤ its exact cause is unknown, genetic, diet, obesity, and environmental factors, such as smoking, infection and contact with silica.

➤ Females have a higher risk of developing rheumatoid arthritis than males.



➤ Rheumatoid arthritis can develop at any age, it develops mostly in the middle ages between the thirties and sixties.



- 
- **The main treatment for rheumatoid arthritis is anti-rheumatic drugs to reduce pain and inflammation, slow the progression of joint destruction that called a disease-modifying anti-rheumatic drug(DMARD).**
  - **The most common examples of DMARD are methotrexate (MTX) which is used as chemotherapy, and Etanercept which is considered a biological treatment.**

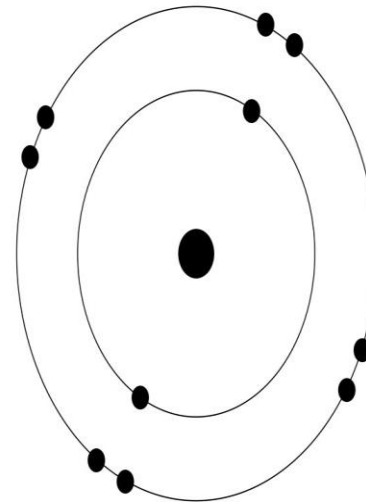
## ❖ Antioxidant System

- Antioxidants are substances that protect cells from the damage caused by unstable molecules known as free radicals.
- Antioxidants have the ability to interact with free radicals and preventing them from causing damage.
- Low levels of antioxidants, or inhibition of the antioxidant enzymes, causes oxidative stress and may damage or kill cells.

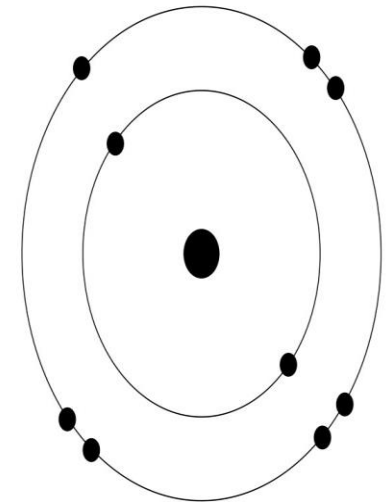


### Free Radical

When a stable molecule loses an electron, it becomes a free-radical.

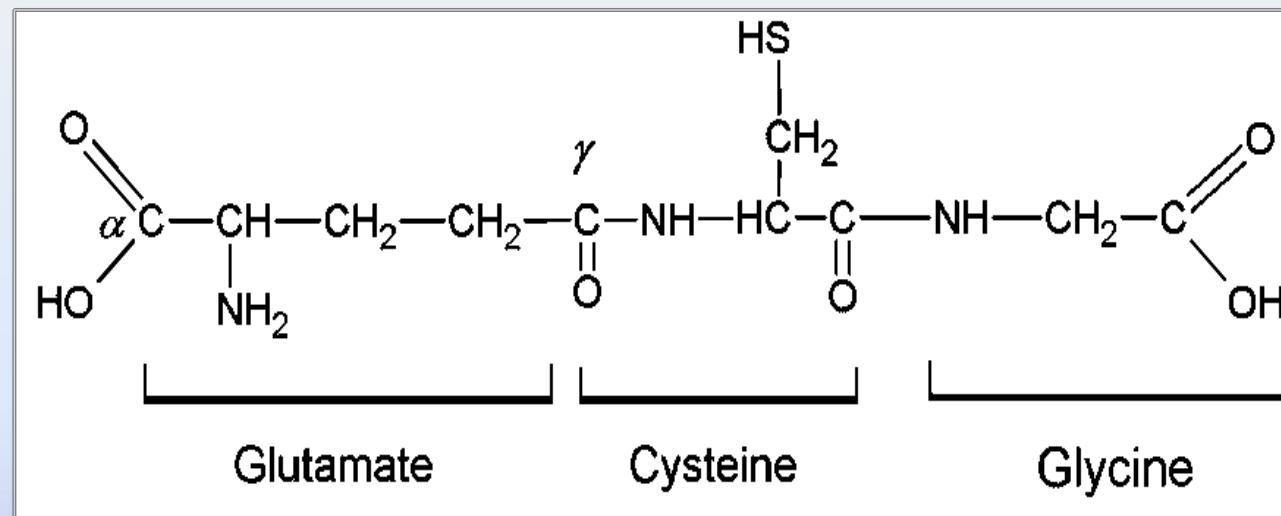


ANTIOXIDANT



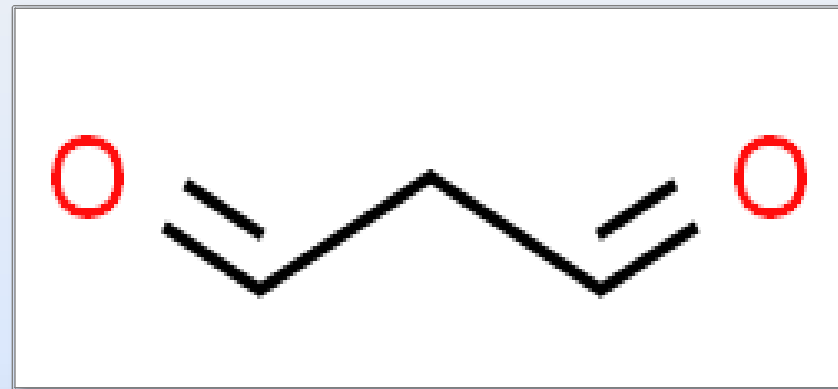
FREE RADICAL

- Glutathione (GSH) is a tripeptide non-protein thiol molecule, with multiple functions in living organisms.
- It acts as an antioxidant, as a carrier of an active thiol group in the form of a cysteine residue.





- Malondialdehyde (MDA) is one of the final products of polyunsaturated fatty acids peroxidation in the cell membranes.
- Malondialdehyde (MDA) is a marker of oxidative stress that is used to determine the level of damage of cell membrane lipid by ROS.



---

## ❖ Trace Elements

- **The term trace elements refer to the chemical elements present in a natural material in very small amounts.**
- **Trace elements are dietary minerals required in very small quantities for proper growth, development, and physiology of the organism.**
- **Trace elements are essential for enzymes reactions by functioning as catalysts or cofactors in enzyme systems.**
- **Their role including immune functions, regulation of gene expression, antioxidant defence, and prevention of chronic diseases.**
- **An imbalances in the amount of trace elements lead to various hazardous effects. Any changes in the optimum levels of these elements may affect most of the human biological processes.**



# AIMS OF THE STUDY

## ❖ AIMS OF THE STUDY

1

evaluate the effect of some rheumatoid arthritis

treatments on the inflammation markers, liver functions, renal functions and lipid profiles

2

measure the level of some trace elements in the sera of rheumatoid arthritis patients and healthy individuals

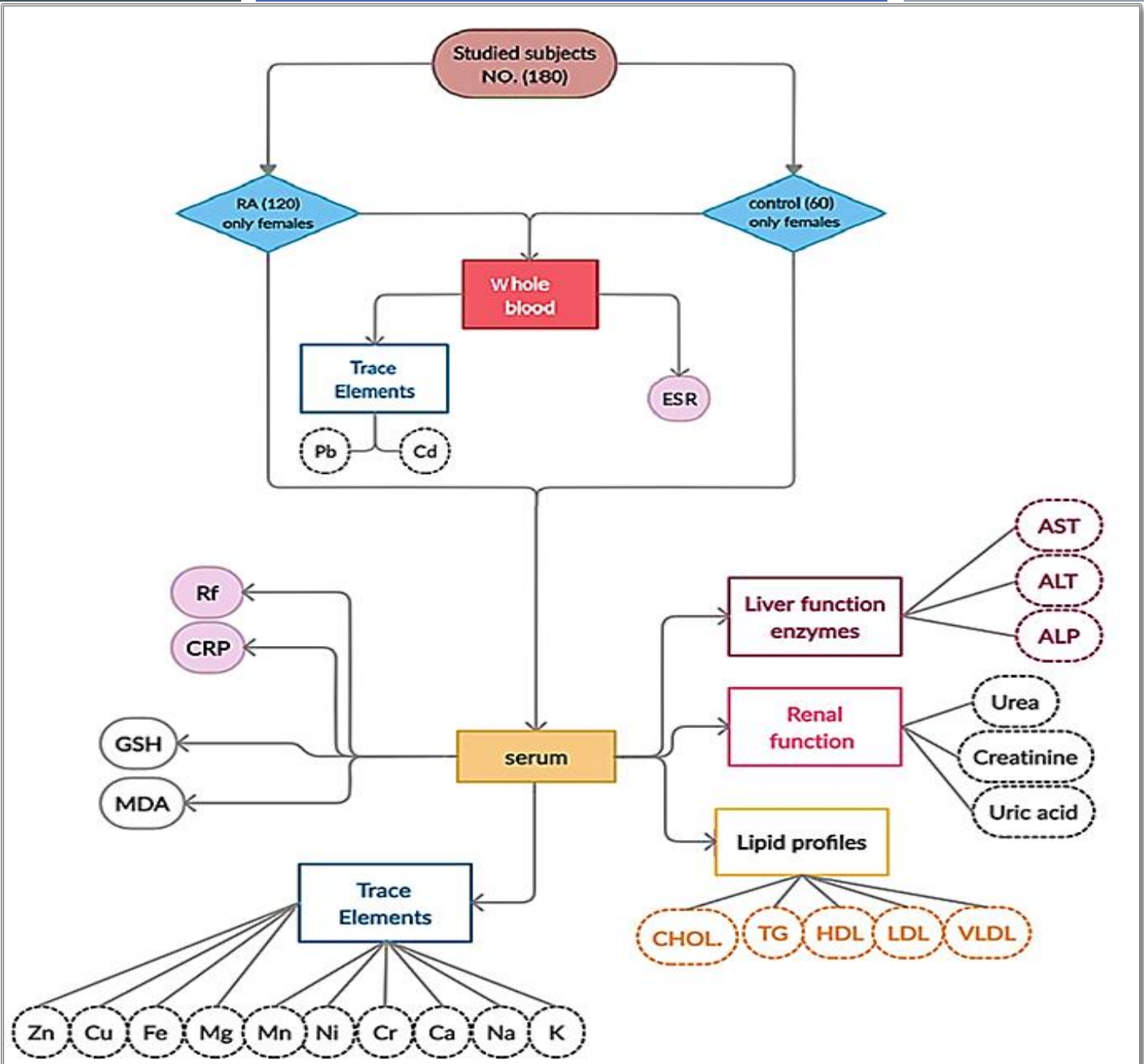
3

measure the level of antioxidant (GSH) and lipid peroxidation marker (MDA) in the sera of rheumatoid arthritis patients and healthy individuals



# Materials AND Methods





**RESULTS**



➤ Anthropometric data obtained from patients with Rheumatoid Arthritis and control groups are summarized in Table 3-1.

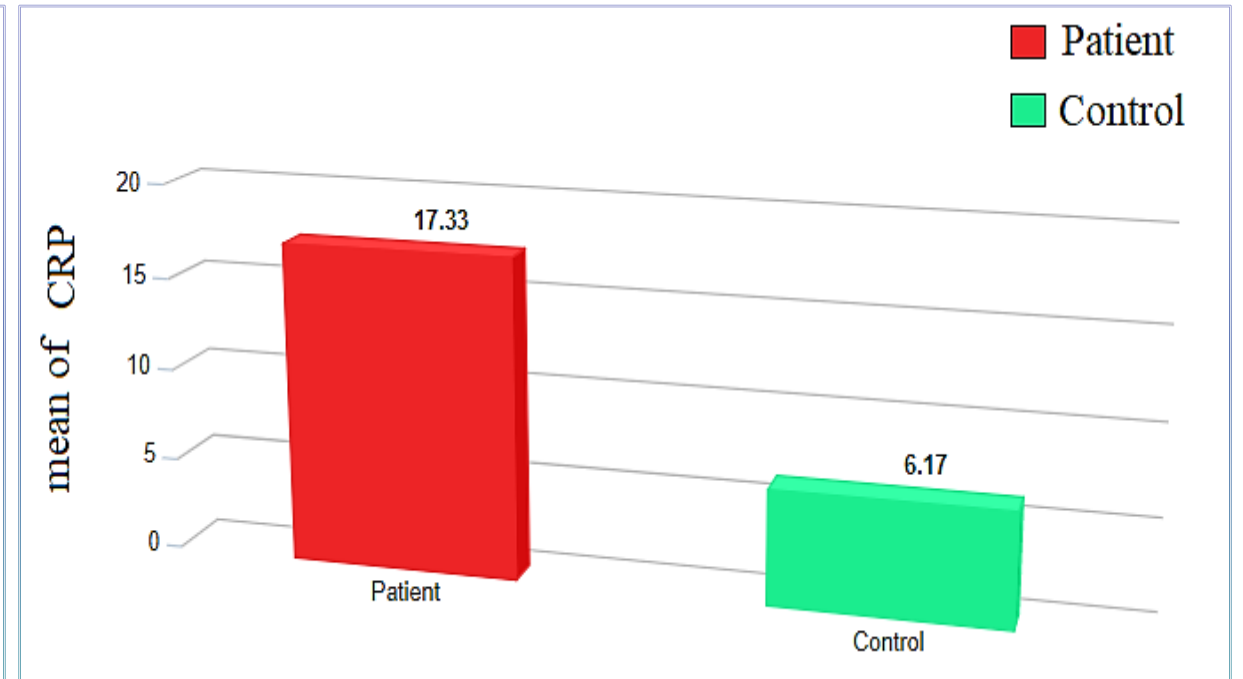
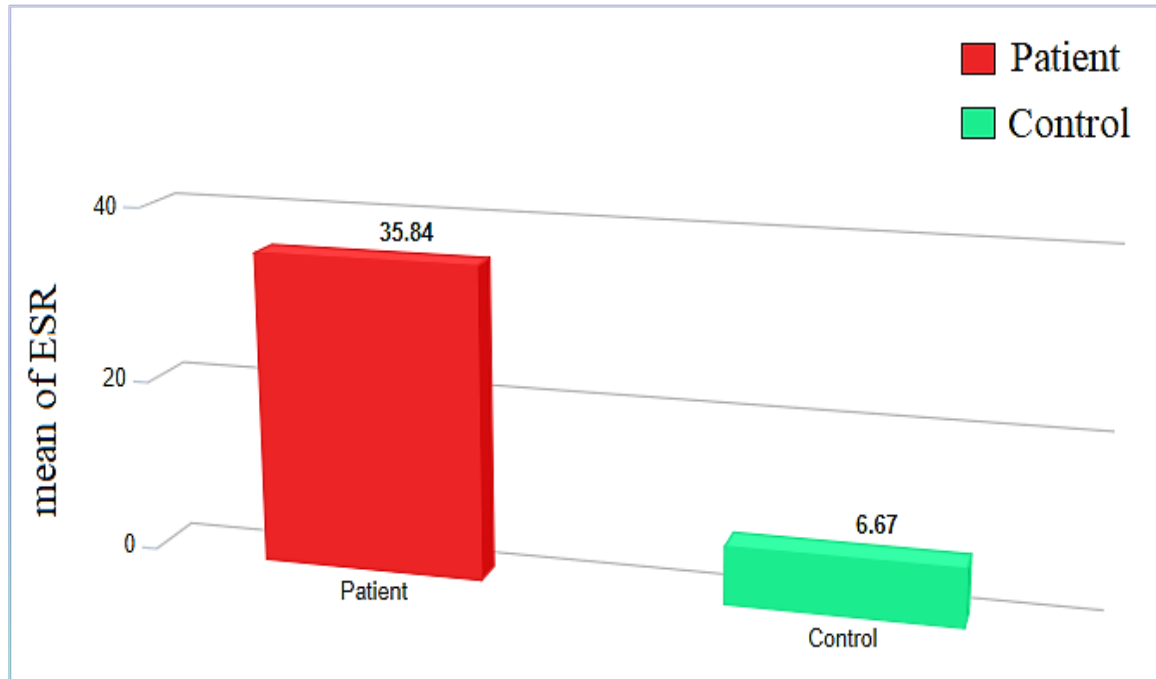
parameters	Patient		Control		P-value
	Mean	Std. Deviation	Mean	Std. Deviation	
Age (year)	48.56	11.87	43.05	12.96	0.322 NS
BMI (kg/m <sup>2</sup> )	26.50	4.04	26.85	3.07	0.565 NS



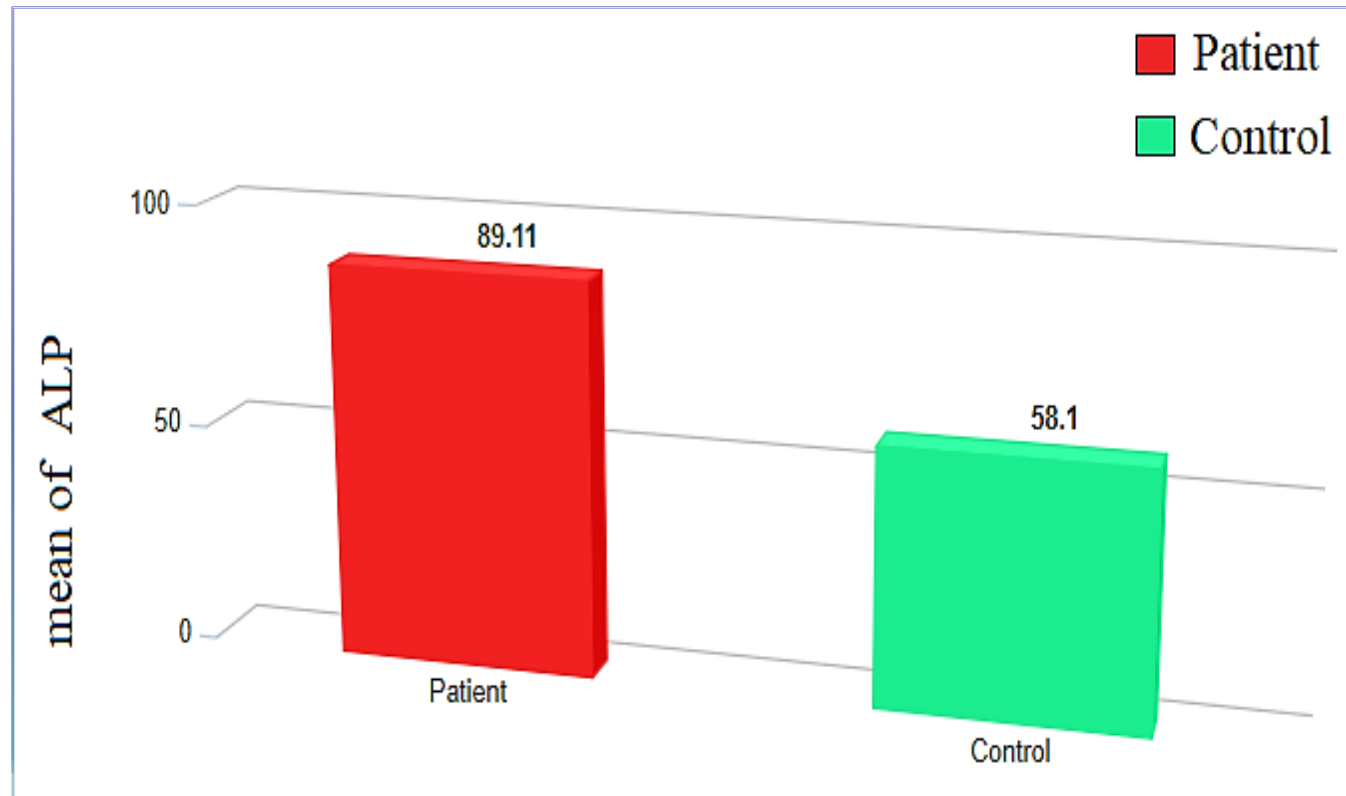
- The rheumatoid factor for RA patients was 100% positive compared with the controls group which was 100% negative, as shown in Table 3-2.

	<b>Patient</b>		<b>Control</b>	
<b>Rf</b>	Positive (+ve)	100%	Negative (-ve)	100%

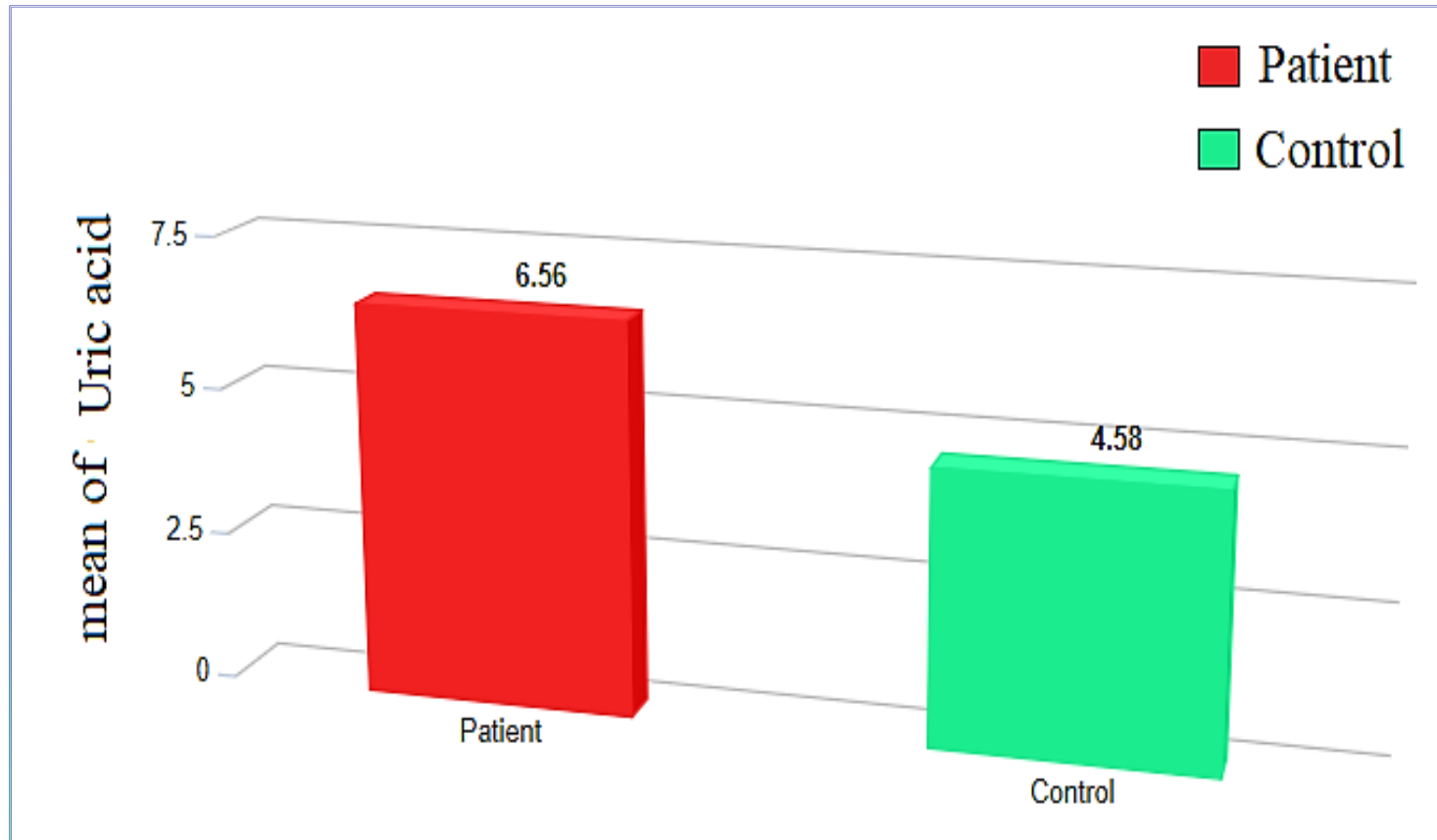
➤ The results of ESR and CRP showed a significant increase for rheumatoid arthritis patients compared with the control group.



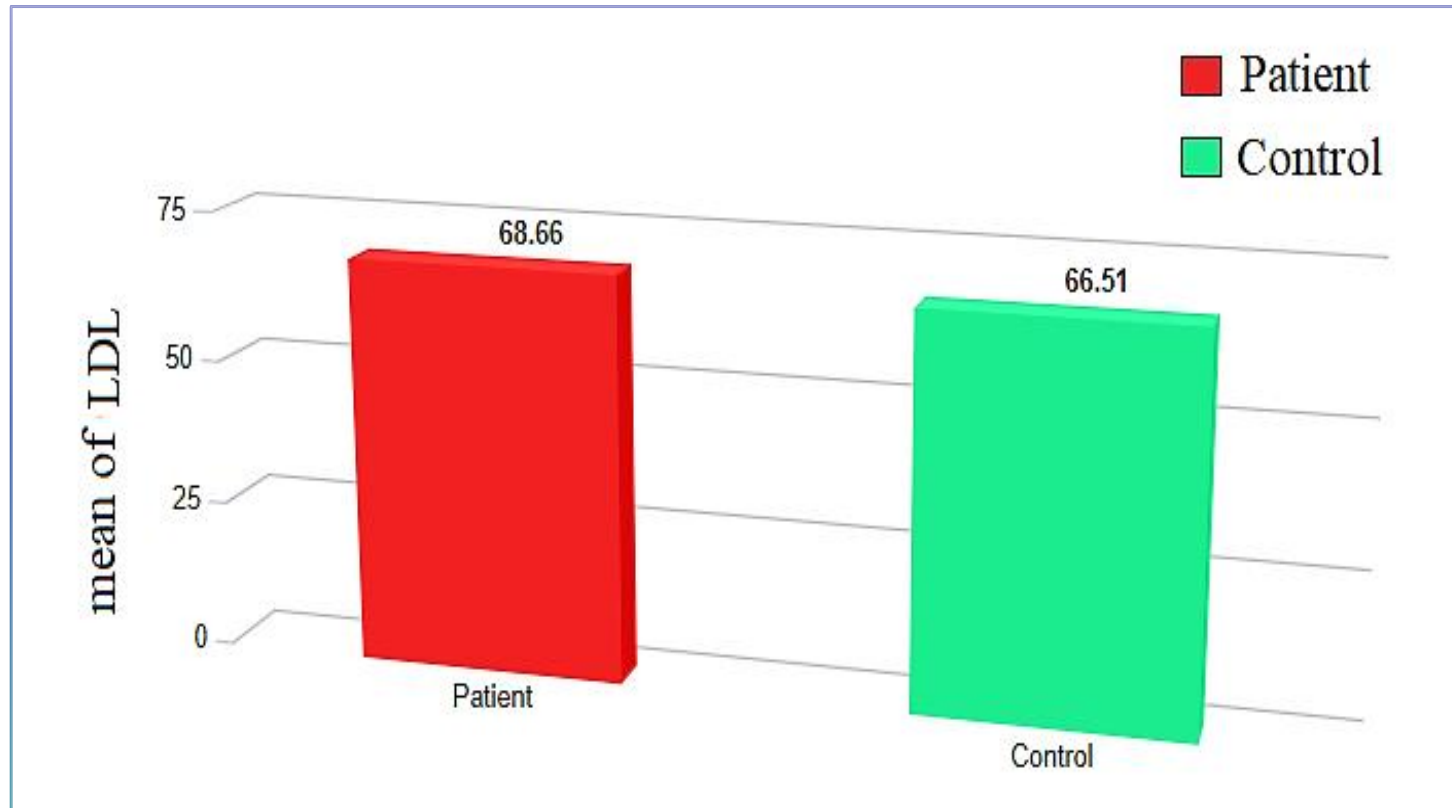
- The results of liver enzymes activity (AST,ALT, and ALP) showed a significant increase in patients with rheumatoid arthritis compared to the control group.



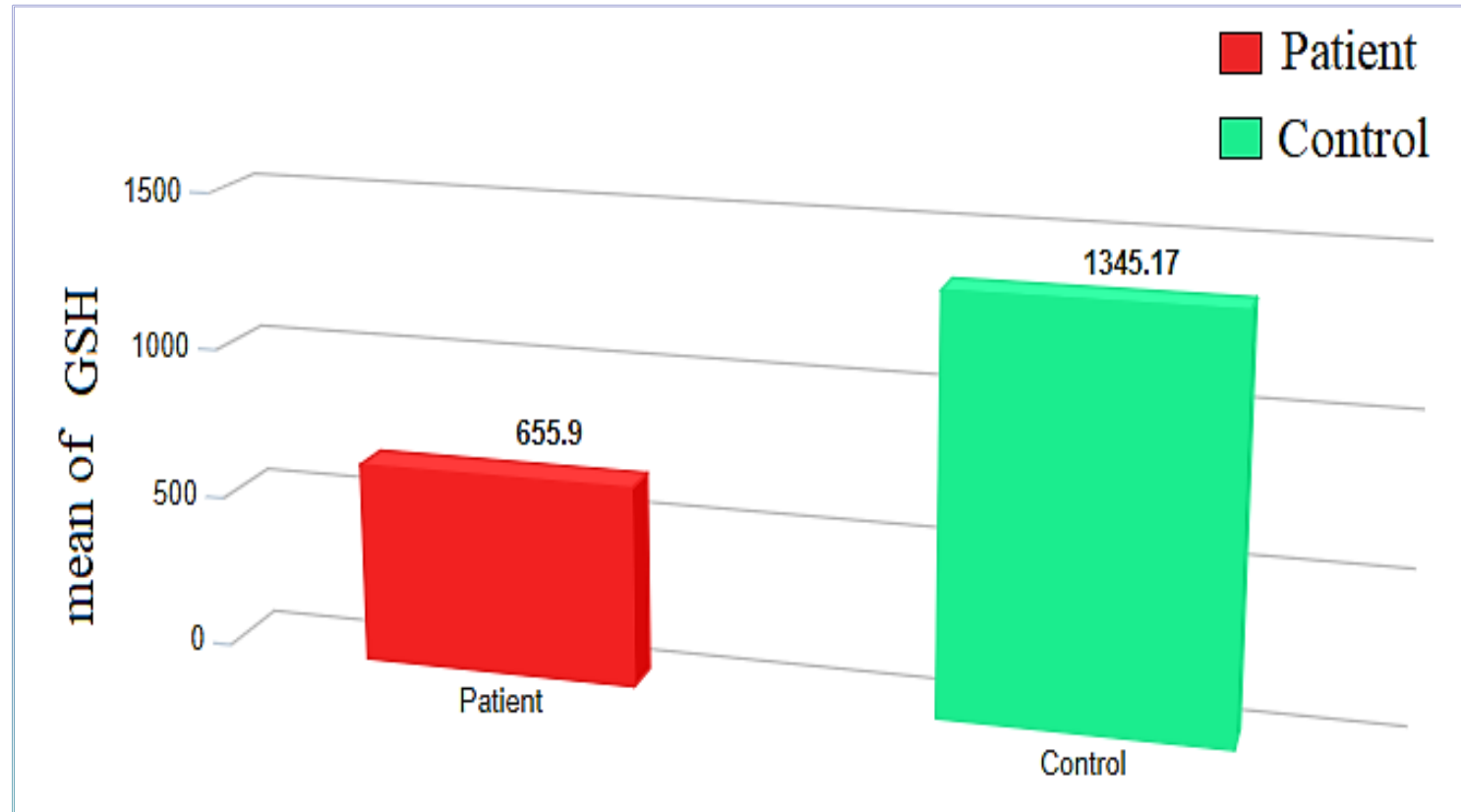
➤ The results for renal function (blood urea and creatinine) were significantly higher than the control group, while a non-significant increase in uric acid was recorded for patients compared to the control group.



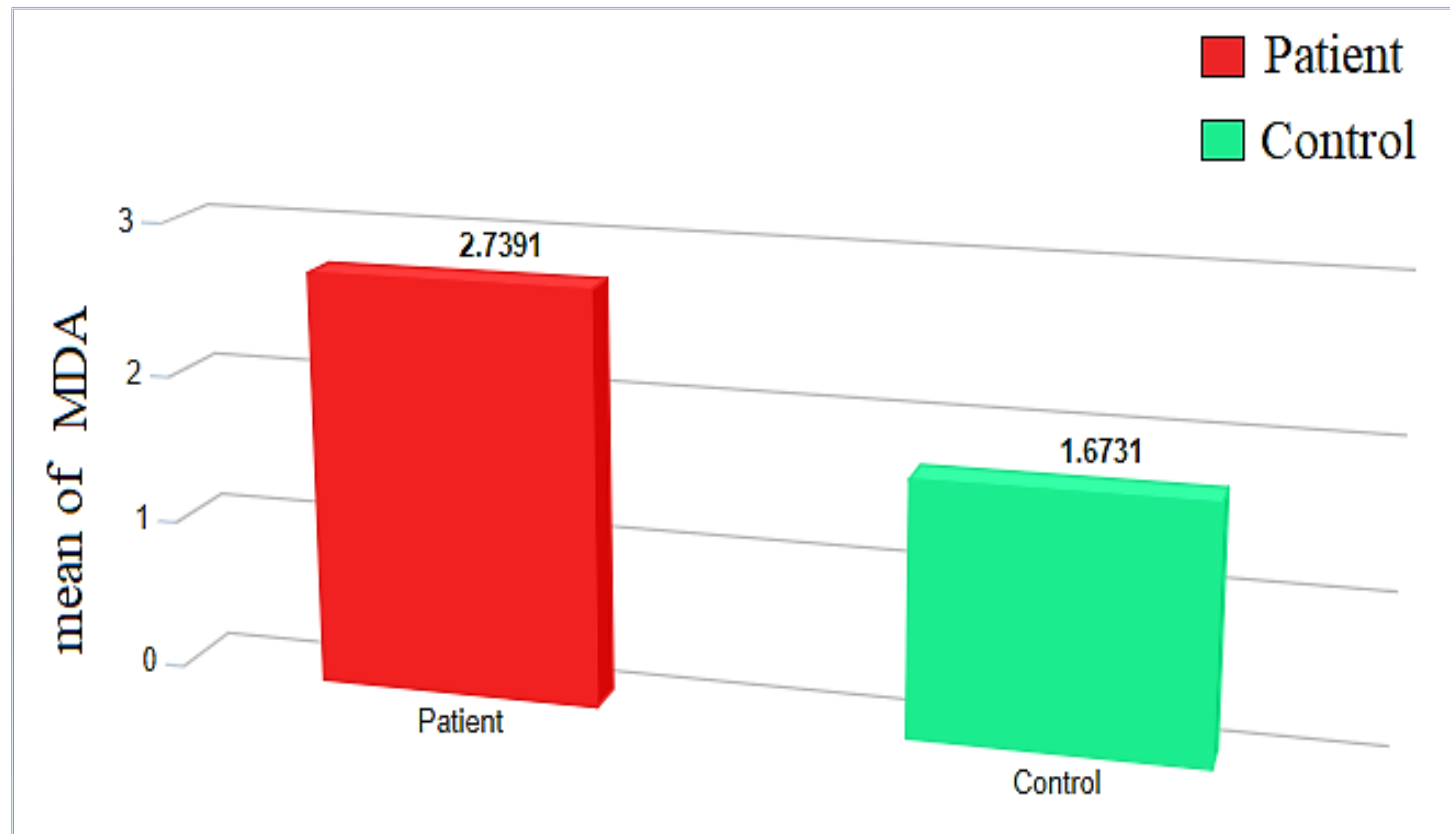
- The lipid profile values appeared to be higher for rheumatoid arthritis patients compared to the control group.



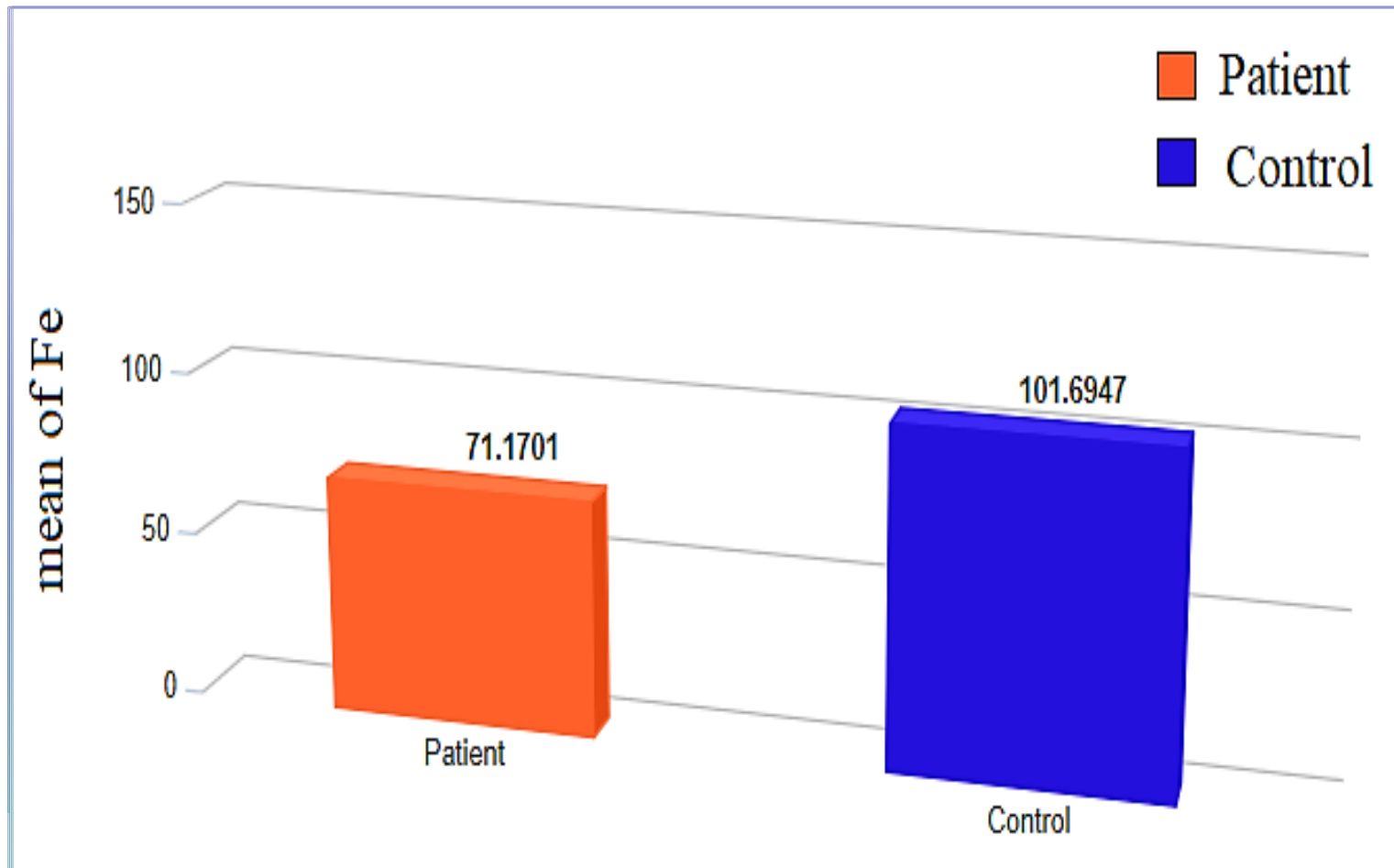
➤ **GSH concentration was significantly lower for the patients than controls group.**



➤ MDA values was significantly higher in RA patients than the control group.

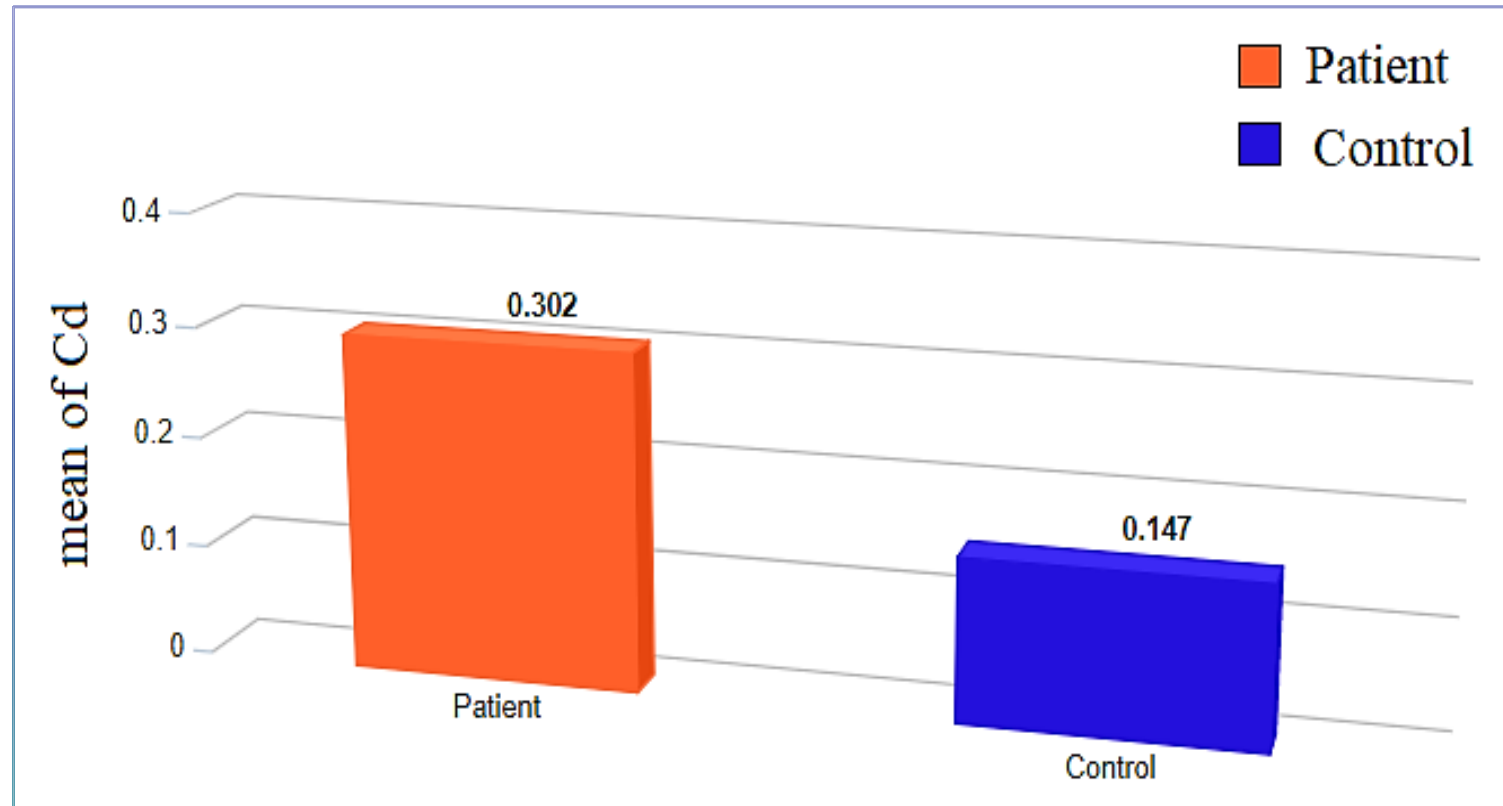


- values of Zn, Mg, Mn, Cr, Ca, K and Fe were lower in the serum samples of RA patients compared with control group.





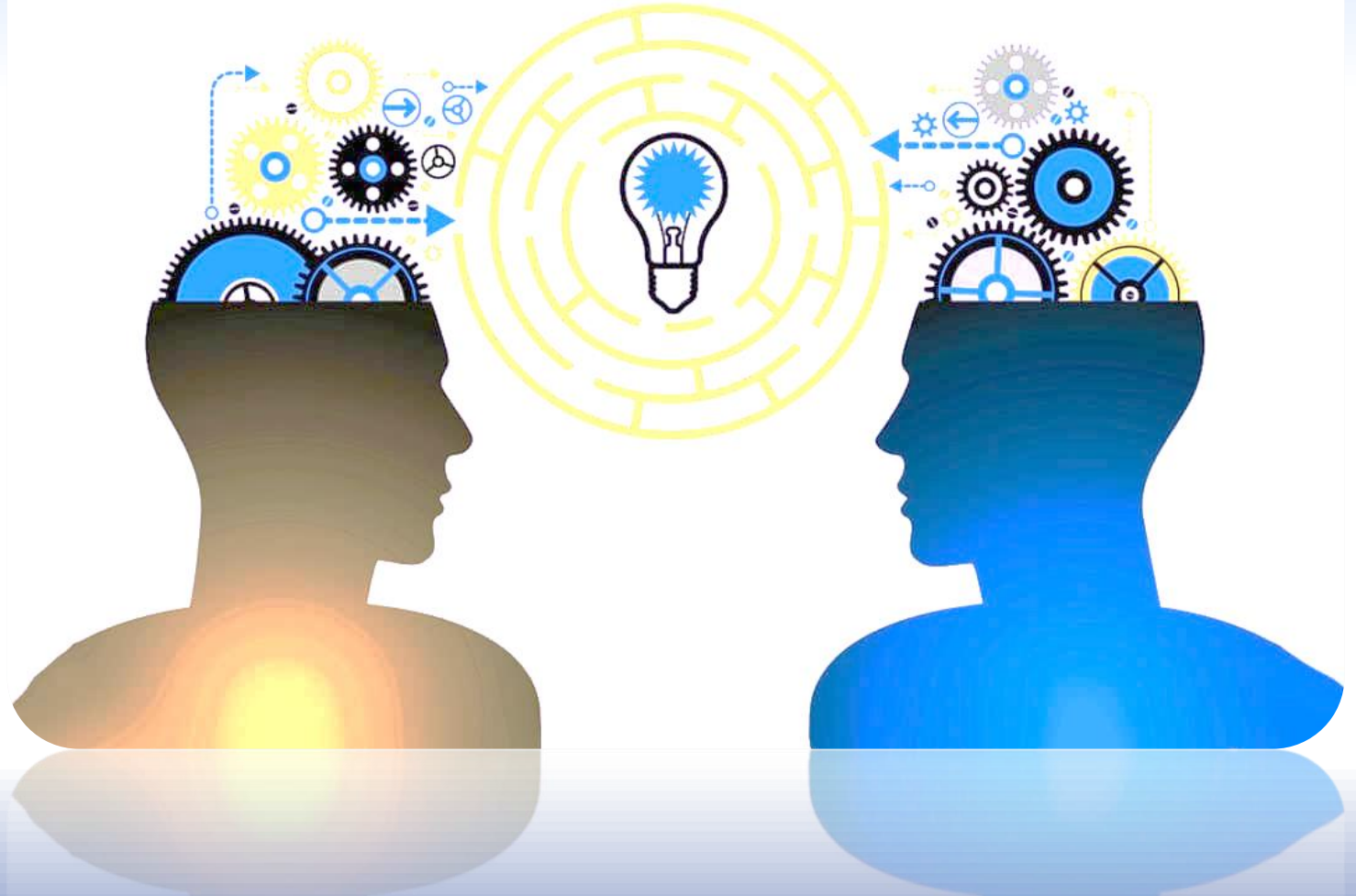
- The results of Cu, Ni, Na, Pb and Cd were significantly higher for RA patients in compared with controls.



➤ Trace Elements Ratios for patient with rheumatoid arthritis and control groups is shown in Table 3-3.

	patient	control
<b>Zn/Cu</b>	0.45	0.86
<b>Cu/Zn</b>	2.21	1.16
<b>Na/k</b>	38.67	34.87

Con**clu**sion



- 
- 1. The results of the current study showed an increase in the activity of liver function enzymes, and kidney function. These results may reflect the potential effect of DMARDs therapy on liver and kidney function.
  
  - 2. The current work showed that abnormalities in the lipid profiles are closely related to RA. The results confirm that cholesterol, HDL, and VLDL may be useful in identifying patients at risk of developing rheumatoid arthritis.
  
  - 3. Measurement of oxidative stress biomarker and antioxidants (MDA and GSH) may be a useful way to demonstrate oxidative stress and test the effect of therapeutic agents in preventing the damage in arthritis, measuring oxidative stress can serve as a biomarker for monitoring disease activity and severity in RA patients.

- 
- 4. The present work is focus to assess the levels of some trace elements that may be valueable and may have predictive significance in the early diagnosis, prognosis and therapy evaluation of RA.
  - 5. The results indicated that the mean values of Cu, Ni, Na, Pb and Cd were significantly higher in serum samples of RA patients compered with controls. The increased level of these elements may reflect their potential role in the pathogens of rheumatoid arthritis.
  - 6. The mean values of Zn, Mg, Mn, Cr, Ca, K and Fe were lower in the serum samples of RA patients compared with healthy control. The reduction in these elements contributed in the inflammation diseases due to their roles in the synthesis of some antioxidants or due to their effect on the immune system.

---

➤ 7. in this study, the data indicate that the Cu / Zn and Na / k ratios can be a great value in the diagnosis and assessment of rheumatoid arthritis patients.

➤ 8. Finally, it can be suggested that the trace elements involved in the present work may have a vital role and predictive significance in complex disorders leading to rheumatoid arthritis. The exact mechanism responsible for changes in levels of these elements in rheumatoid arthritis patients is unclear and requires additional evaluation by further studies.

**RECOMMENDATION**



## ❖ RECOMMENDATIONS

01

The implications of treatments against RA must be taken into account and studied in detail. Therefore, more researches are needed to determine the exact effect of DMARDs on liver function, kidney function and lipid profiles.

02

Further studies of other antioxidants levels are needed for RA patients and determine whether trace elements affect their levels.

03

Antioxidant supplements, such as vitamins, zinc and other nutrients, appear to be a potential therapeutic agents in the management of rheumatoid arthritis. More clinical trials may be required to evaluate the effect and safety of adding antioxidant supplements to treat rheumatoid arthritis.

04

Further studies are required to confirm the relationship between trace elements and the immune system for RA patients.



*Thank You ...*

