



## **Evaluation of Serum Iron Status in Sudanese Chronic Renal Failure Patients**

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### **ABSTRACT**

*Renal failure is one of the more common medical conditions affect Sudanese people in which renal fail to adequately filter waste product from blood that is characterized by chronic blood loss with iron deficiency state with decrease serum iron which reflect the amount of iron immediately available for haemoglobin and red blood cell synthesis. This was descriptive cross-sectional study aimed to determine the serum iron level in Sudanese patients with renal failure. Following informed consent, fifty subjects patients with chronic renal failure (CRF); (63 %) male and (37 %) female, and age and sex matched fifty healthy subjects as controls were enrolled. Serum iron was measured using spectrophotometer. Mean Serum iron level was significantly lower among chronic renal failure cases when compared with the control (P.value 0.009). The study also showed significant decreased of serum iron level according to age groups of chronic renal failure patients, and significant decreased in male than female (P.value 0.002), and also decreased of serum iron when increasing the duration of disease with (P.value 0.000). In conclusion, the study confirms the iron deficiency state in chronic renal failure.*

**KEYWORDS:** Iron deficiency, Anaemia, Serum iron, Chronic renal failure, Sudan.

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### **INTRODUCTION**

Renal failure also knows kidney failure or renal insufficiency is a medical condition in which the kidney fails to adequately filter waste product from blood [1].

Renal disease is a popular disease for people all over the world, since now there is no treatment can help cure the renal. For or most of the renal disease patients their lives with dialysis or kidney transplant [1].

Little is known regarding iron status among patients with chronic renal disease (CRD), except for those with stage 5 disease on hemodialysis. In hemodialysis, iron deficiency is a common problem that hinders the effectiveness of erythropoietin treatment [2].

Anemia's common in renal failure, and iron deficiency plays a pivotal roles as cause. Iron is critical for hemoglobin synthesis consequently patients should be carefully evaluated for the availability of iron, by measuring the serum iron [3].

The serum iron reflects the amount of iron immediately available to hemoglobin synthesis. Iron deficiency has been show to be present in as many as 25% to 37.5% of patients presenting with anemia of chronic kidney disease [3].

There is a spectrum iron deficiency that occur in patient with renal failure specially when treat with erythropoietin stimulating agents (ESA), because this agent stimulate the bone marrow to a supraphysiologic rate of the RBCs production. The normal rate of iron delivery to bone marrow which is constrained by the amount of circulating iron [1].

Absolute iron deficiency occur in patient with renal failures because frequent blood loss with gastrointestinal bleeding, this may be compounded by decrease oral iron absorption because of dietary restriction [1].

According to ESA the defiance is relative, present of amount of the iron in the body normal according to normal person. But in ESA the setting of ESA driven bone marrow stimulation the rate at which iron

release from stores and the rate at which iron are being delivered by transferrin to erthroid marrow insufficient to keep up with RBCs production [1].

## MATERIALS AND METHODS

This was a cross-sectional descriptive study based on laboratory data of fifty patients with chronic renal failure (CRF) hospitalized in Elmak neimer Hospital University in Shendi locality and compared with fifty subjects age and sex matched controls. The investigations were performed on venous blood sample drawn into plain tubes (without anticoagulant) to obtain serum sample. We compared between the patient group and the control group, the P.value is the basis for deciding whether to reject the null hypothesis. If the observed significance level is small enough, usually less than 0.05 the null hypothesis is rejected and P.value < 0.05 is significant.

## RESULTS

**Table (1): Show the mean serum iron for case (chronic renal failure patients) and control group (healthy people).**

Pair	Mean ( $\mu\text{g}/\text{dl}$ )	P.value
CRF	50.84 $\mu\text{g}/\text{dl}$	0.009
Control	74.48 $\mu\text{g}/\text{dl}$	

**Table (2): Show the mean of serum iron of chronic renal failure patients according to sex group.**

Sex	Mean $\mu\text{g}/\text{dl}$	P.value
Male	55.88 $\mu\text{g}/\text{dl}$	0.002
Female	43.3 $\mu\text{g}/\text{dl}$	

**Table (3): Show the mean of serum iron of chronic renal failure patients according to duration of disease.**

Duration	Mean $\mu\text{g}/\text{dl}$	P.value
1-3 Years	49.31 $\mu\text{g}/\text{dl}$	0.000
>3 Years	32.84 $\mu\text{g}/\text{dl}$	

**Table (4): Show the mean of serum iron according to age group in chronic renal failure patients.**

Age Group	Mean of Serum Iron $\mu\text{g}/\text{dl}$	P.value
10-20 years	80 $\mu\text{g}/\text{dl}$	0.007
21-30 years	75 $\mu\text{g}/\text{dl}$	
31-40 years	52 $\mu\text{g}/\text{dl}$	
41-50 years	57 $\mu\text{g}/\text{dl}$	
More than 50 years	29.8 $\mu\text{g}/\text{dl}$	

## DISCUSSION

This was descriptive cross sectional study, was conducted in El-mak Nmer Hospital University to evaluate the serum iron level in chronic renal failure patients. We found that the half of chronic renal failure patients subjects in the Sudan would be considered iron deficient.

The mean of serum iron level in chronic renal failure patients was (50.84  $\mu\text{g}/\text{dl}$ ), and in normal control was (74.48  $\mu\text{g}/\text{dl}$ ), when compared between these results the P.value was (0.009), that is mean there was significant differences in serum iron level. When compare with previous study that done in India, showed that mean of serum iron was (84.31  $\mu\text{g}/\text{dl}$ ) and total patients were iron deficiency <sup>(4)</sup>, and another result in New Delha showed that renal failure patient developed a significant decline in serum iron [5].

This study showed that the level of serum iron in men (63 %) was more than women (37%) (P.value0.002), another study done in Iraq also explained increased level of serum iron in men than women [6], and this may be due to physiological reasons.

The duration of the disease can affected significantly (P.value0.000) the serum iron by decreased it in this study, and the main reason for decreased due to most of renal failure classified as patients of chronic disease, in these conditions, there is primarily a decreased availability of iron, relatively decreased levels of erythropoietin, and a mild decrease in the lifespan of RBCs to 70-80 days (normally 120 day) [7].

Also our study showed that the more age group affected was more than 50 years old, other study showed that increased the onset after 50 years old and was the most common among adults older than 70 years old [8].

## CONCLUSION

The study showed a statistically significant decreased in mean of serum iron level in chronic renal failure patients compared to the control groups, so diagnosis of iron deficiency and guidance of iron supplementation should be made in these patients.

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