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Original Research

Evaluation of serum magnesium and zinc level in patients with chronic renal failure

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ABSTRACT:

Background: Chronic renal failure (CRF) can cause abnormalities in the elemental status of physiological fluids and tissues, which can result in either an excess or a shortage of these nutrients. The present study was conducted to assess serum zinc and magnesium level in patients with chronic renal failure patients. **Materials & Methods:** 64 chronic renal failure patients of both genders were selected in this study. 2 groups were made. Group I had CRF patients undergoing hemodialysis and group II hadhealthy control. Serum magnesium and zinc level were studied. **Results:** Group I had 38 males and 26 females and group II had 34 males and 30 females. The mean magnesium level before dialysis in group I was 2.90 µg/L and after treatment was 1.86 µg/L. In group II, the mean magnesium level before dialysis was 2.08 µg/L and after was 1.92 µg/L. The mean zinc level before dialysis in cases was 278.2 µg/L and after was 170. µg/L. In group II, the mean zinc level before dialysis was 298.6 µg/L and after was 218.4 µg/L. The difference was significant (P< 0.05). **Conclusion:** In patients with chronic renal failure, level of zinc and magnesium falls after dialysis.

Key words: Chronic kidney disease, Magnesium, Zinc

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INTRODUCTION

Chronic renal failure (CRF) can cause abnormalities in the elemental status of physiological fluids and tissues, which can result in either an excess or a shortage of these nutrients. The mechanisms underlying these changes are not well understood, and it is unclear how much of the symptoms of CRF are caused by toxicity or elemental deficiency.[1] Reduced food intake and the low element content of some low-protein diets suggested in CRF to slow the onset of renal injury are among the factors contributing to these changes. In CRF, low levels of circulating zinc have been seen. Although the reason for the decline is unknown, it might be a result of the low-protein diets these patients are advised to follow. A portion of the zinc shortage in CRF may also result from changes in intestinal absorption and impairment.[2]

Reduced intestinal absorption, changes in tubular transport, or loss of ion-transporting plasma proteins can also contribute to zinc insufficiency in CRF. For hemodialysis patients, the essential trace element levels must be determined. The patient's lifestyle, hemodialysis facilities, and therapy measures are to blame. Reduced intestinal absorption of magnesium, decreased magnesium intake, and decreased tubular resorption of magnesium ions are all associated with CRF.[3]

Hemodialysis is said to cause the loss of a few trace elements, including zinc, selenium, and manganese. It is dubious how crucial trace element measurement is for tracking how long-term hemodialysis affects blood levels of trace elements.[4] In CRF, low levels of circulating zinc have been seen. Although the reason for the decline is unknown, it might be a result of the low-protein diets these patients are advised to follow. Reduced intestinal absorption, changes in tubular transport, or loss of ion-transporting plasma proteins can also contribute to zinc insufficiency in CRF.[5]The present study was conducted to assess serum zinc and magnesium level in patients with chronic renal failure patients.

MATERIALS & METHODS

The present study consisted of 64 chronic renal failure (CRF) patients of both genders. All agreed to participate in the study with their written consent.

Data such as name, age, gender etc. was recorded. Two groups were formed. Hemodialysis patients with

CRF were in group I, while age-matched control people were in group II. Five millilitres of venous blood were extracted in an aseptic manner. Samples of serum were divided and examined using the atomic absorption method. Data thus obtained were analysed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Groups	Group I (CRF)	Group II (Healthy)
Male	38	34
Female	26	30

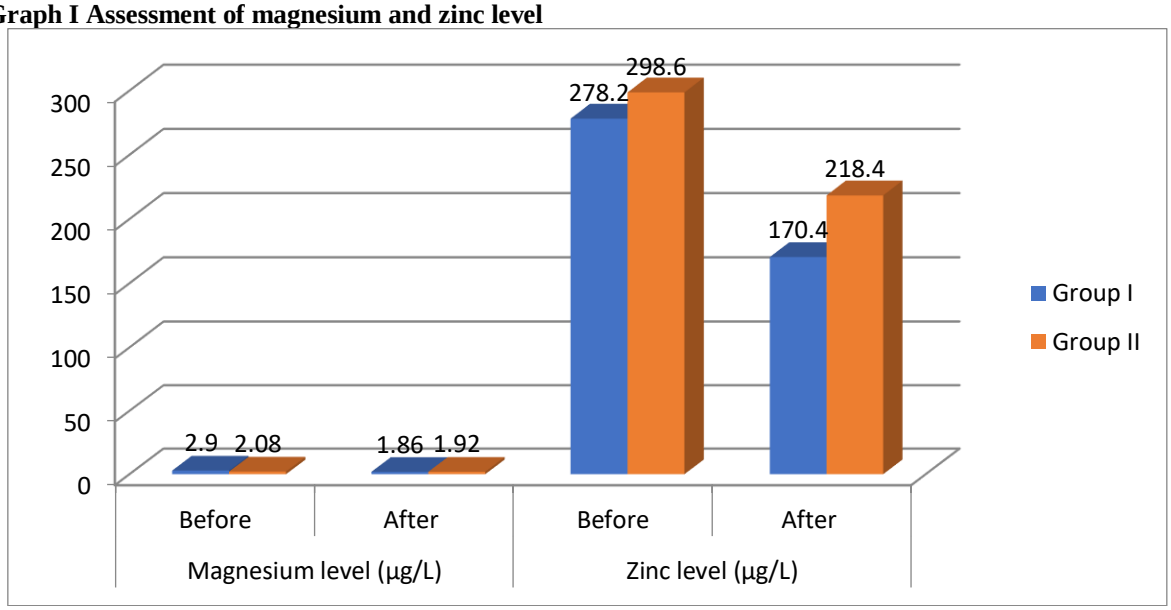
Table I shows that group I had 38 males and 26 females and group II had 34 males and 30 females.

Table II Assessment of magnesiumand zinc level

Parameters	Variables	Group I	Group II	P value
Magnesium level (µg/L)	Before	2.90	2.08	0.97
	After	1.86	1.92	0.92
Zinc level (µg/L)	Before	278.2	298.6	0.05
	After	170.4	218.4	0.01

Table II, graph I shows that mean magnesium level before dialysis in group I was 2.90µg/L and after treatment was 1.86µg/L. In group II, the mean magnesium level before dialysis was 2.08µg/L and after was 1.92µg/L. The mean zinc level before dialysis in cases was 278.2 µg/L and after was 170.µg/L. In group II, the mean zinc level before dialysis was 298.6µg/L and after was 218.4 µg/L. The difference was significant (P< 0.05).

Graph I Assessment of magnesium and zinc level



DISCUSSION

The primary cause of hospitalisation and death for those with chronic renal disease is cardiovascular disease. When renal replacement treatment (RRT) was initiated, the severity of cardiovascular illness suggests that the disease began early in the course of CKD.[6,7] One of the established traditional cardiovascular risk factors in both the general population and CKD patients is dyslipidemia. This cardiovascular risk factor is frequently seen in CKD patients.

In patients with chronic kidney disease (CKD), dyslipidemia is linked to a quick deterioration in renal function and the start of RRT.[8] Although the exact process is unknown, it has been hypothesised that mesangial cells bind to and absorb oxidised low-density lipoprotein (LDL), which subsequently damages mesangial, epithelial, and endothelial cells by encouraging the migration of inflammatory cells like macrophages that produce cytokines.[9,10]The present study was conducted to assess serum magnesium and zinc level in patients with chronic renal failure patients.

In present study,group I had 38 males and 26 females and group II had 34 males and 30 females.Sanchez et al.'s[11] study on the nutritional status of magnesium and zinc found that patients with CRF were able to construct a low-protein meal that satisfied their demands thanks to a nutritional intervention. Two groups of forty adult volunteers were used to compare the impact of the intervention. The nutritionally taught group received dietary instruction to help people make

food choices that matched their needs, whereas the control group followed their regular prescribed diet. At the beginning and end of the trial, plasma levels of magnesium and zinc were examined. In the group that received nutritional instruction, participants consumed more carbs, magnesium, and zinc while consuming less protein. There was a correlation (r = 0.37) between plasma zinc and creatinine clearance, a marker of glomerular filtration rate.

We observed that the mean magnesium level before dialysis in group I was 2.90 µg/L and after treatment was 1.86 µg/L. In group II, the mean magnesium level before dialysis was 2.08 µg/L and after was 1.92 µg/L. The mean zinc level before dialysis in cases was 278.2 µg/L and after was 170. µg/L. In group II, the mean zinc level before dialysis was 298.6 µg/L and after was 218.4 µg/L. Zn metabolism in patients undergoing renal transplantation and with functional allografts up to 96 months post-transplant was examined by Mahajan et al.[12] (12). They came to the conclusion that patients who had received transplants less than a year ago had subnormal zinc levels in their plasma and hair, along with hyperzincuria. Patients who had received their transplants more than a year ago, on the other hand, had plasma zinc levels, hair zinc, and urine zinc excretions within normal limits. Some patients with renal failure who had received transplants more than a year ago had zinc concentrations in their plasma and hair that were subnormal and comparable to those of hemodialysis patients. According to these findings, zinc and taste abnormalities can last for up to a year after a transplant and may be linked to higher urine zinc losses.

Piechota et al[13]assessed zinc status in patients with chronic renal failure (CRF) plasma and erythrocyte zinc levels in 13 patients undergoing regular haemodialysis. Additional determinations of plasma copper, plasma and erythrocyte magnesium and potassium were also performed. The mean plasma zinc level was slightly less than normal, but the difference was not statistically significant. The erythrocyte zinc content, however, as well as erythrocyte magnesium and potassium levels were significantly increased. This increase may be partly related to haemolysis in uraemia. Plasma copper concentration in CRF patients did not differ significantly from the control level. The almost normal plasma zinc concentration, elevated erythrocyte zinc, and normocupraemia do not indicate zinc deficiency in CRF patients.

CONCLUSION

Authors found that in patients with chronic renal failure, level of zinc and magnesium falls after dialysis.

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