Evaluation of Serum Zinc levels In Chronic Kidney Disease patients on Dialysis in North Telangana

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ABSTRACT

Introduction: Zinc is an essential trace element that is essential for overall growth and development and for the proper functioning of the immune system. Deficiency of zinc can enhance the expression of certain proteins known as angiotensin II that constrict the blood vessels in kidneys and further aggravate the condition of individuals with obstructive kidney disease. Chronic kidney disease (CKD) is one of the leading cause of morbidity and mortality worldwide. Incidence of CKD is rising which is likely to pose major problem for both health care and economy in India. Dialysis is a form of renal replacement therapy for severe kidney failure.

Aim of the study: The Present study is aimed to evaluate the role of zinc and renal parameters predicting CKD in patients undergoing hemodialysis.

Materials & Methods: A group of 25 normal healthy subjects (controls-A), 25 CKD patients on hemodialysis (test group -B) were enrolled in the study. Zinc, Urea, Creatinine and serum albumin levels were estimated in the sample collected from normal and CKD-HD subjects.paired student't'test was applied to calculate 'p'value using graphad calculator.

Results: The results of two groups were expressed as Mean±SD. The values of zinc and albumin were significantly decreased in CKD-HD group compared with that of controls. 'P' value is 0.0001 which was considered as extremely statistically significant.

Conclusion: This study found that decreased zinc can be used as an indicator for severe damage of kidney in hemodialysis.

Keywords: Chronic kidney disease, End stage renal disease, Hypozincemia, Hemodialysis

INTRODUCTION

CKD is defined as a chronic processes with multiple etiologies resulting in decrease in nephron number and function leading to ESRD[1]. CKD is one of the leading cause of morbidity and mortality worldwide. The incidence rate is 229 per million population[2]. Dialysis is a mode of renal replacement therapy in CKD and kidney transplantation increases the survival rate in those patients[3,4]. Zinc has multiple roles in the body. It is not directly involved in the metabolism of proteins, complex carbohydrates and lipids, but also in the synthesis of nucleic acids, the gastrointestinal absorption of other elements, bone metabolism and oxygen transportation[5,6,7]. Zinc is an important and essential component of a number of proteins and enzymes, including RNA polymerase, CA, Cu-Zn Superoxide dismutase and zinc finger protein. It is recognized as a cellular antioxidant because zinc is a component of SOD which can inhibit NADPH Oxidase and decrease the production of hydroxyl radicals, and can thus stabilize thiols in zinc proteins[8]. More over besides being a component of neurotransmitters, it also plays an essential role in proper functioning of the immune response, both cellular and humoral. The changes in the levels of Zinc absorption and excretion are the crucial mechanisms for sustaining Zinc homeostasis[9,10]. In the cases of extremely high or low Zinc intake in the organism adaptive changes in renal excretion of Zinc take place[11,12,13]. Besides this mechanism cellular and tissue distribution also occur and changes in plasma albumin level as main Zinc carrier[14,15]. The Present study is aimed to evaluate the role of zinc and renal parameters predicting CKD in patients undergoing hemodialysis.

MATERIALS AND METHODS

The present study was carried out during the period between April - 2016 to September – 2016 in the Department of Biochemistry, Prathima Institute of Medical Sciences, Nagnur, Karimnagar . A total number of 50 subjects were included in this study and divided into two groups. Group-A includes 25 normal healthy subjects, Group-B includes 25 CKD-HD patients. Subjects younger than 18 years of age were excluded. Moreover, exclusion criteria included patients with absence of diagnosis of end stage renal disease any type of malignancy and chronic liver disorders.Normal healthy subjects and CKD patients on HD were included.

Institutional ethical clearance was obtained prior to the study. Informed consent was obtained from all the subjects. 5 ml of venous blood was collected in plain vacutainer and allowed to clot for 30 minutes and centrifuged at 3000 rpm for 10 minutes. The obtained serum was analyzed for Serum Zinc by Colorimetric method[16]. Serum albumin by bromocresol blue method[17], Blood urea by Berthelot method[18] and Creatinine by modified Jaffe's method. The analysis of the above parameters was done by using commercially available kits on CPC semi auto analyser and transasia XL-640 clinical chemistry analyzer.

Statistical analysis: Data was presented as mean ± SD. Student "t" test was applied between two groups and 'P' value was calculated. 'P' value of < 0.001 was considered as statistically significant.

RESULTS

The present study was conducted in 50 subjects of which 25 CKD –HD subjects(Test group) and 25 normal healthy subjects (control group). The mean±SD of Urea in CKD-HD was 134.06±20.08 and 27.40±5.72 in controls. Significantly increased urea levels was observed in CKD-HD compare to controls with 'p' value <0.001.The mean ±SD of Creatinine in CKD-HD was 11.32±3.33 and in controls was 1.12±0.26. Creatinine level was significantly raised in CKD-HD with 'p' value <0.001 compared with that of controls. The mean ±SD of serum zinc in CKD-HD was 36.486±33.97 and in controls was 79.429±10.861. Serum zinc levels was significantly decreased in CKD-with hemodialysis with 'p' value 0.0001compared with that of controls. The mean±SD of albumin in CKD-HD was 3.1 ±0.33 and in control 3.7±0.28.The albumin level was significantly decreased in CKD-HD compared with controls with a 'p'value < 0.0001.

Table 1: Comparison of mean values and standard deviation between CKD-HD and Controls

PARAMETERS	Group-A (Control) N=25 mean±SD	Group-B (CKD-HD) N=25 mean±SD	'P' VALUE
Urea	27.40±5.27	134.06±20.08	<0.001
Creatinine	1.12±0.26	11.32±3.33	<0.001
Zinc	79.429±10.861	36.486±33.97	0.0001
Albumin	3.7±0.28	3.1±0.33	<0.001

DISCUSSION

Zinc deficiency is a common consequence of, or contribution to human inflammatory disease.We found that hemodialysis patients appear to have lower levels of zinc compare to control. Zinc deficiency is a leading cause of disease in developing countries[19], and is associated with delayed wound healing [20], and immune deficiency characterized by impaired cell proliferation, abnormal T-cell function, defective phagocytosis, and abnormal cytokine expression[21,22,] all of which might contribute to the excess risk of infection observed in hemodialysis patients [23,24,25,26,27,28]. Many studies have shown a high prevalence of Zn deficiency in CKD patients who were under either conservative or dialytic treatment[29-33]. Bozalioglu et al[30] showed that patients on maintenance hemodialysis exhibit zinc deficiency and disturbed immune response. In this study serum zinc levels were decreased whis was in parallel to Bozalioglu et al. It is well known that patients on chronic HD are at high risk of developing trace element imbalances which can further induce different abnormalities in this patients.

Alterations of serum zinc during HD are still unclear and are probably affected by individual patient's metabolism and specific illness. Future studies have to address more specific parameters, e.g., as patient's age, duration of HD and medication Future studies are needed in order to investigate whether zinc supplements can decrease the complications in late-stage CKD patients.

CONCLUSION

We found that Hemodialysis was highly prevalent in north Telangana. Average blood levels of biologically important trace elements like zinc were substantially different in Hemodialysis patients, compared with healthy controls. Our study found that decreased zinc can be used as an indicator for severe damage of kidney in hemodialysis and need supplementation for management of HD adverse effects.

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