Original article

Pre and Post levels of serum Ferritin and Ceruloplasmin in Chronic Kidney Disease Patients on Hemodialysis

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Abstract

Back ground- chronic Kidney disease (CKD) is a complex condition, where the decrease in kidney function is accompanied by numerous metabolic changes affecting virtually all organ systems of the human body. It is estimated that 1,00,000 new patients of End Stage Renal Disease (ESRD) enter renal replacement programs annually in India.

Aim- to determine the Pre and Post levels of serum Ferritin and Ceruloplasmin in Chronic Kidney Disease (CKD) patients on Hemodialysis.

Material and Methods- CKD patients who are on maintenance dialysis were studied during the period of 2009-2011. Pre and Post levels of Ferritin and Ceruloplasmin were measured by Latex Enhanced immunotrbidimetry and Terbidometric Immuno assy method. Control group consisted with normal subjects without CKD matching in age and sex with the patients.

Statistical analysis- data were analyzed using 't' test for their level of significance.

Results- the mean Ferritin levels in Pre and Post hemodialysis samples was significantly higher than in the controls. The mean Ceruloplasmin Pre and Post levels in CKD patients showed highly significant increase as compared to control group. Low degree association between serum Ferritin and Ceruloplasmin in CKD patients on Hemodialysis was observed.

Conclusion- ferritin and Ceruloplasmin levels showing a higher status of inflammation and infection. Inflammation implicated as one of the reason of the high burden of atherosclerotic cardiovascular disease and death in CKD patients.

Key words- Chronic kidney disease,Ferritin, Ceruloplasmin

Introduction

CKD is a public health problem with increasing prevalence, with poor outcome and high cost. The major adverse outcomes of CKD include loss of kidney function sometimes leading to kidney failure, complications of decreased kidney function and also development of cardiovascular disease and premature death. According to the first annual report published by the CKD registry of India involving patients, Diabetes and Hypertension were major cause of CKD in India according for 28.5% and 16.2% respectively as in other parts of the world.[1] The prevalence of CKD is raising world wide. The global patient population with an ESRD continued to grow at the rate of 7 % per annum due to demographic transition, increase in disease leading to chronic renal disease and increased availability of diagnostic and therapeutic facilitis.[2]Hemodialysis is the mainstay of

treatment for ESRD, as for more patients with ESRD receive Hemodialysis therapy. However, it should not be forgotten that this life saving treatment has only been routinely applied for ESRD for the pas 35 years.[3] Ferritin is a protien whose principal role within cells is the storage of iron in a nontoxic, but biovailable form.[4] ferritin is also used as inflammatory marker. High concentration of serum ferritin, a frequently used marker of iron storage in dialysis patients and acute phage reactant may be a marker of morbidity and mortality in these patients. Ceruloplasmin also inflammatory marker.[5] Therefore, the present study was planned to determine the ferritin and ceruloplasmin levels and its correlation in CKD patients.

Material and Methods

The present study was carried out in the Department of Biochemistry. Chronic Kidney Disease patient who are on maintenance Dialysis were studied from tertiary care hospital during the period of 2009-2011.diognosis of CKD patient was done by clinicians and confirmed by estimating e-GFR. Control group consisted of normal subjects without CKD, matching in age and sex with the patients.Study protocol was approved by ethics committee and consent was obtained from each participant in the study. The subjects having other diseases like terminally ill, multi organ involvement patients were excluded from this study. Blood samples were collected in plain bulb and centrifuged at 300 R.P.M for 5 minutes. Serum was separated and stored in polythene tube with cork. Serum samples were preserved at a $0\text{-}4^0$ C until tested. The stored sera were used for estimation of ferritin by latex enhanced immunotarbidimetry method[6] and ceruloplasmin by Turbidometric immune assay method[7]. Statistical analysis was performed using Minitab software. The data of patients and controls was analyzed by students 't' test.

Results and Discussion

Table No . 1 Serum Ferritin and Ceruloplasmin levels in Chronic Kidney Disease Patients on hemodialysis and in Controls.

Subjects	FERRITIN Ng/ml Mean ± SD	CERULOPLASMIN Mg/dl Mean ± SD
Pre-dialysis sample of CKD patients	4593.15± 1333.74*	53.16±10.70*
Post dialysis sample of CKD patients	6943.80±1379.19*	107.44±17.47*
Controls	155.85±37.72	37.31±6.77

The statistical method used to compare data was "t" test.

*P < 0.001 – Highly Singnificant.

The mean ferritin levels in pre and post hemodialysis samples were 4593.15 ± 133.74 ng/ml and 6943.80 ± 1379.19 ng/ml respectively and that of control group were 155.85 ± 37.72 ng/ml respectively. Highly significant (p<0.001) increase was found in CKD patients samples as compared to controls. Ferritin is an acute phase reactant, its level increases sharply in the presence of inflammation and infection. Inflammation probably is the most common confounder in CKD associated hyperferritinemia observed in our stud y. We found a further and significant increase in ferritin levels of CKD patients Post dialysis as compared to the levels of Pre dialysis samples. The procedure of dialysis may increase oxidative stress, with reduction in total anti-oxidant capacity, thereby further raising inflammation status of CKD patients, which may result in increased Ferritin level.

The mean Ceruloplasmin levels in CKD patients showed highly significant increase (p<0.001) in CKD patients as compared to control group. In CKD patient Ceruloplasmin levels in Pre and Post hemodialysis sample were 53.16±10.70mg/dl and 107±17.47mg/dl respectively and in controls it was37.31±6.77mg/dl.

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Correlation between Ferritin and Ceruloplasmin levels.

In our study low degree association between serum Ferritin and Ceruloplasmin in CKD patients on hemodialysis. Ceruloplasmin in common with Ferritin, is an acute phase protein that is altered by inflammation (Graph no-1). Results of Krischbaum **B. et al** supports our study.[8] To conclude, elevated levels of Ferritin and Ceruloplasmin observed in our study indicate that a high degree of inflammation exists in CKD patients. Acute phase protein that is Ferritin and Ceruloplasmin showing a higher status of inflammation and which implicated as one of the reason of the high burden of atherosclerotic cardiovascular disease and death in CKD patient.

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