

Concentration and Significance of Endocrinological and Biochemical Profiles Levels in Relation to the After Effects of Hemodialysis among Patients of Renal Failure in Manipur: North East India

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Abstract:

Background: CKD, which is referred as chronic renal failure, has been concluded recently among the group of lifestyle diseases of 21st century, which is often characterized as a progressive and often irreversible disorder.

Materials and Methods: This study has been performed among renal failure patients of both males and females in the age group of 18 to 65 years and those who were on dialysis. The aforementioned study was done before and 4 hours after performing hemodialysis. Samples were collected from the Regional Institute of Medical Sciences, Imphal, Manipur, from the study period of February 2016 to January 2017. 15 normal persons with the normal renal parameters without any history of renal disorder in the past were also selected in between this comparable age group. SPSS software is used for collection, analysis and summarization of all the data.

Results: The values of blood urea were significantly higher among the pre-dialysis group. On the other hand, the blood urea level among the post-dialysis group was found to be significantly lower. While serum copper values among both the pre-dialysis and post dialysis groups were significantly lower as compared to the control group. Serum calcium levels in the pre-dialysis group were found to be lower. We also found that serum phosphorus levels among the pre-dialysis group were significantly higher as compared to the post-dialysis group.

Conclusions: The serum concentrations of calcium and sodium which are obtained in post-dialysis depend upon the composition of dialysate of aforementioned elements and serum available for the ultra-filtration.

Keywords: Renal, Dialysis, Biochemical.

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Introduction

CRF or chronic renal failure refers to a slowly progressive disease of the function of kidney progressing over a period of months and years. [1] It is associated with low glomerular filtration rates (GFR).

CRF is often characterized by severe illness and its treatment requires special replacement therapy of renal system such as dialysis. [2] The overall incidence of CRF affects mostly middle-ages and older people which include 1 of every 5000 subjects. In course of time, it might eventually progress to total irreversible kidney failure. [3,4]

The kidney's physiological function consists of passing fluids and waste products from the blood stream and removing them thorough urinary route. [5] For some of patients who have suddenly impaired their renal function or who have reached end stage renal stage, dialysis is considered to be one line of treatment, which causes extensive toxic

fluids and metabolic end products removal from the body. [6] So here in this aforementioned study, we estimated the pre and post dialysis mean values of renal biochemical markers in chronic renal failure patients proceeding dialysis to evaluate the effects of dialysis on CRF patients.

Aims & Objectives

The main objective of this study was to obtain the inter-relationship between thyroid function status in chronic kidney disease and serum iron indices. It also shows the effect of CKD on thyroid hormonal status and stratifies the severity of renal anomalies by EGFR and therefore correlates the stages of CKD with FT3, FT4, TSH and serum iron level.

Material and Methods

The aforementioned study was performed among renal failure patients who were upon dialysis within the age group of 18 to 65 years consists of males

and females. Study has been performed before and 4 hours after haemolysis. Samples were picked up from Regional Institute of Medical Sciences, Imphal from February 2016 to January 2017. 15 normal persons consist of renal parameters within normal limits without any history of renal impairment before were also selected among the compatible age group. Ethical clearance was obtained from Research Ethics Board, Imphal and written consent was taken after explaining them the whole research protocol. Around 10 ml of venous blood devoid of any kind of anticoagulant was taken into sterile clean and dry polypropylene tubes to avoid any kind of contamination. We have avoided haemolysis, blood was then allowed to clot.

The serum was centrifuged after separation and transferred into dry, clean and sterile polypropylene tubes. At -20 degree centigrade, the tubes have been labelled and stored inside a refrigerator. Within one week to 10 days of sample collection, serum zinc and copper were evaluated by atomic absorption spectrophotometry (AAS). Other biochemical tests were performed on the same day or next day. Blood urea measurement was performed by Diacetyl monoxime method. Serum creatinine was estimated by colorimeter by Jaffe's alkaline picrate method.

Flame photometer has been used for determination of serum sodium and serum potassium. Serum calcium levels were determined by titration method using ethylene diamine tetra acetic acid. Colorimetric study was done for estimation for serum phosphate using Fiske and Sub barrow method. Calculation of the results was performed with SPSS software. Chi Square test and one way ANOVA were conducted for the measurement at significant level.

Results

Table 1: p-value for the mean values of serum and hematological parameter in control group, pre dialysis group and post dialysis group

Parameter	Control group (A)	Pre dialysis group (B)	Post dialysis group ©	P value (B vs C)	P value (A vs B)	P value (A vs C)
Mean serum calcium (mg/dl)	9.8	8.86	9.3	0.01*	0.01*	0.01*
Mean serum zinc (µg/dl)	106.17	49.8	55.4	0.01*	0.01*	0.01*
Mean serum copper (µg/dl)	117.23	86.00	65.88	0.01*	0.01*	0.01*
Mean blood urea (mg/dl)	29.4	152.77	83.36	0.01*	0.01*	0.01*
Mean serum phosphorus (mg/dl)	3.73	6.9	4.1	0.01*	0.01*	0.01*
Mean serum creatinine (mg/dl)	0.9	8..8	4.9	0.01*	0.01*	0.01*
Mean serum Sodium level (mEq/L)	139.2	135.49	137.04	0.12	0.01*	0.01*
Mean serum potassium level (mEq/L)	4.3	5.3	3.6	0.01*	0.01*	0.01*

*= significant

Table 1 projects the p-value for the mean values of hematological parameters among control group, post and pre-dialysis group. Regarding this study, following outcomes were obtained.

Blood urea levels: The values of blood urea among the pre-dialysis group were significantly higher (p value<0.05). It was significantly lower among the post-dialysis group.

Serum creatinine: Serum creatinine values in pre-dialysis group were higher which was significant as compared to the post-dialysis group (p value<0.05).

Serum potassium: The values of serum potassium were lower as compared to post dialysis group (p value<0.05).

Serum sodium: The levels of serum sodium were lower in pre-hemodialysis and post hemodialysis patients as compared to controls.

Serum zinc: The levels of serum zinc in pre and post dialysis group were lower as compared to the control group. However in comparison with the pre-dialysis group, the mean values of post-dialysis group were considerably lower.

Serum copper: The levels of serum copper among both pre and post-dialysis group was significantly lower in comparison with the control group where p value is <0.05.

Serum calcium: The levels of serum calcium among the post-dialysis group were higher than pre-dialysis group which was significant with p-value<0.05. Serum calcium levels in pre dialysis group were very much lower.

Serum phosphorus: The levels of serum phosphorus among pre-dialysis group were significantly higher as compared to the post dialysis group (p value<0.05).

Discussion

One of the prevalent and progressive diseases which causes irreversible fall in the glomerular filtration rate that results in elevation in values of serum creatinine and blood urea nitrogen values is referred as chronic renal failure. [7] Hypertension, auto immune disease, diabetes mellitus etc forms the most prevalent cause of chronic renal failure. Though it is irreversible in nature and leads to further severe form as time passes, with a decrease of glomerular filtration rate from 5 to 10 percent with high levels of uremia. [8] These biochemical fluctuations of the blood project the characteristics of the disease. Measurement of renal excretory fluctuations can be performed by measuring the serum level of the compounds excreted by the kidney and also serum levels of the electrolytes among the body fluids such as that of potassium, sodium etc can also be conducted as a diagnostic tool for the assessment of renal diseases. [9,10] So here we estimated the pre and post dialysis mean values of serum renal biochemical markers among CRF patients who undergo dialysis to evaluate the effect of dialysis among CRF patients.

We have checked that in case of present observation, pre-dialysis group portrayed an increase in the levels of the Urea and Creatinine which were statistically significant with p value <0.05 (table 1). This observation is because of full in the GFR among CRF patients. As the GFR falls, plasma levels of creatinine and urea rise as they have been eliminated by tubular secretion and glomerular filtration. Serum creatinine and blood urea levels in the post-dialysis group portrayed a significant fall as compared to the pre-dialysis group.

In this aforementioned study, serum sodium levels in the pre-dialysis group are lower than the control group which are statistically non-significant (p value >0.05). The post- dialysis group projected a slight increment. Again, serum levels of zinc among both pre and post dialysis groups were lower and were statistically significant. As compared to pre- dialysis group, post-dialysis group projected slight increment in the serum zinc levels (TABLE 1). Seethalakshmi et al made comparison of the salivary urea levels and levels of other serum biochemical parameters in patients as per the end stage renal disease at pre and post dialysis stage. They examined patients who underwent renal failure induced hemolysis.

They examined 30 patients and collected venous blood prior to dialysis and after the procedure of dialysis. First they captured the samples from the patients and immediately transferred the specimens to the laboratory for total assessment of sodium, potassium, creatinine, urea and phosphate through an automated biochemical analyzer they found

statistical significant difference when these results were examined by paired t-test and analysis.

As per the results, they included that in chronic dialysis patients, routine biochemical work using blood might be conducted through keeping with observation of parameters of salivary glands in short period of time. Cheng et al expressed the changes happened in the salivary urea, uric acid and creatinine before and after hemodialysis among patients with end stage renal disease. They projected serum and salivary levels of Cr, Urea and UA among the dialysis patients and examined by biochemical analyzer. They found that in case of renal disease patients, high amount of correlation persists among dialysis patients as per various biochemical parameters.

As per results, they portrayed that similar clearing effect of serum and salivary Cr, urea and UA level is observed among renal disease patients. Rodriguez- Carmana et al presented an exploratory analysis of serum irisin levels among patients underwent various CKD (Chronic Kidney Disease) treatments. As per the results, they included that among patients with CKD, serum irisin levels are low which projected an association between GFR and plasma bicarbonate levels.

Kritmetupak et al expressed the correlation of biochemical parameters as per the relation with renal disease. According to the results, they expressed that for the survival of the patients, DPI is a good indicator, Mohiuddin et al examined no significant association among Vitamin D levels with immune response to hepatitis B vaccine in this study.

Conclusion

As per our findings or results, it has been hypothesized that among uremic patients, decreased absorption of calcium happens. The serum concentration of calcium and sodium obtained in post-dialysis depend upon the composition of dialysate of these elements and also serum obtained for ultra- filtration.

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