

Chronic Kidney Disease Pre and Post Hemodialysis

Dr. Santosh Kumar

PG Resident, Department of Medicine, Muzaffarnagar Medical College and Hospital, Muzaffarnagar, U.P., India

Abstract: ***Introduction:** Chronic kidney disease is defined as kidney damage or GFR less than 60 ml / min / 1.73m² for at least three months. **Aim:** To assess the effect of hemodialysis on urea creatinine and calcium levels in patients diagnosed with chronic kidney disease. **Methodology:** Serum urea was estimated by enzymatic method, serum creatinine by jaffes method and serum calcium by phosphotungstic method on biochemistry semiautoanalyser. **Material & Method:** Patient between age group 30-60 yrs of both genders attending nephrology opd with chronic kidney disease undergoing Hemodialysis and willing to participate in study were enrolled in this study. **Results:** Study shows serum creatinine levels in pre and post HD group. Pre-HD had mean values of creatinine levels 10.9±2.5 which are higher than the normal range {up to 1.4 mg/dl} and post HD had mean value of 6.0 ± 1.8. The results showed that the process of dialysis leads to a significant fall in mean serum creatinine levels (p < 0.001) but the values of creatinine are still higher than the normal range. **Conclusion:** The effectiveness of dialysis in reversing any complication of uremia depends on the nature of that complication. Those disturbances which are due to the accumulation of a uremia toxin may be reversible if that toxin is dialyzable and the removal rate by dialysis outstrips its generation rate.*

Keywords: hemodialysis, serum creatinine, serum calcium, serum urea, chronic kidney disease

1. Introduction

Chronic kidney disease (CKD) is becoming a major and alarming public health burden worldwide.

Chronic kidney disease is defined as “kidney damage or GFR less than 60ml/min/1.73m²for at least three months”. (1)

End Stage Renal Disease is the final stage of chronic kidney disease where there is progressive, irreversible loss of endogenous renal function of a degree sufficient to render the patient permanently dependent upon renal replacement therapy like Hemodialysis, peritonealdialysis or transplantation to avoid life threatening uremia. (2)

Dialysis remains the most common form of renal replacement therapy worldwide, due to the high cost associated with renal transplantation and difficulty in getting a compatible organ donor. (3)

Creatinine is produced in the muscles by the non-enzymatic changes of creatine and phosphocreatine. Plasma levels of creatinine reflect endogenous production and GFR. (4)

Therefore creatinin is an excellent indicator of assessment of renal function. Urea is an organic compound, playing a vital role in the metabolism of nitrogen-containing compounds (NPN). (5, 6) Urea is major excretory product of protein metabolism. 90% of it is excreted through the kidneys and kidney disease is associated with accumulation of urea in the blood. (7)

2. Aims

To assess the effect of Hemodialysis on Urea, Creatinine and Calcium levels in patients diagnosed with Chronic Kidney Disease.

3. Methodology

Serum Urea was estimated by enzymatic method, serum creatinine by Jaffe’s method and serum calcium by phosphotungstic method on Biochemistry semiautoanalyser.

4. Material & Methods

Patients between age group 30-60 yrs of both genders attending Nephrology OPD of Muzaffarnagr medical college and Hospital, diagnosed with Chronic Kidney Disease, undergoing Haemodialysis and willing to participate in study were enrolled in this study. Written informed consent was obtained from each patient. (8) Ethical Clearance was obtained from Institutional Ethics committee. Present and past histories of the patients were collected with the help of pre-test proforma. The study group was categorized into pre-HD and post-HD groups.

5. Results

Table 1: Mean and SD of serum creatinine levels in pre and post Hemodialysis group

Groups	Sr. creatinine (mg/dl)	P value
Pre-HD group	10.9±2.5	<0.001
Post-HD group	6.0±1.8	

Table 2: Mean and SD of serum urea levels in pre and post Hemodialysis group

Groups	Serumurea (mg/dl)	P value
Pre-HD group	107.3±33.2	<0.001
Post-HD group	51.1±21.0	<0.001

Table 3: Mean and SD of serum Calcium levels in pre and post Hemodialysis group

Groups	Serum Calcium (mg/dl)	P Value
Pre-HD group	7.3±1.4	<0.001
Post-HD group	8.2±1.6	<0.001

6. Discussion

- Chronic kidney disease (CKD) is a modern day global epidemic and it is now recognized as a public health issue (9).
- CRF that leads to severe illness and requires some form of renal replacement therapy such as dialysis is called end-stage renal disease. CRF occurs in 1.0 of every 5000 people, usually in middle aged and older people, although children and pregnant women are also susceptible (10).
- Dialysis may be used for very sick patients who have suddenly lost their kidney function (acute renal failure) or for quite stable patients who have permanent-ly lost their kidney function (CKD) [11].
- During this study, we found that both genders were equally affected by chronic renal failure but a higher total number of males with ESRD were undergoing hemodialysis.
- Most patients undergoing dialysis were between the ages of 50-60 years, which could be due to advancing age and progressive physiological glomerulosclerosis that leads to a decrease in renal weight.
- Serum creatinine and urea were estimated in CKD patient pre and post dialysis as these are important renal markers in the diagnosis, follow-up and recovery of CKD patients undergoing Hemodialysis.

Table 1 shows serum creatinine levels in pre-HD and post-HD groups. Pre-HD had mean values of creatinine levels 10.9

± 2.5 , which is higher than the normal range (upto 1.4 mg/dl) and Post-HD had mean values of 6.0 ± 1.8 . The results showed that the process of dialysis leads to a significant fall in mean serum creatinine levels ($p < 0.001$) but the values of creatinine are still higher than the normal range. (Figure 1)

- Creatinine is a commonly used as measure of kidney function. It is neither secreted nor reabsorbed so its values are relatively more accurate. Thus, rise in serum creatinine is used in clinical practice as a marker of reduced GFR
- Hemodialysis decreases the creatinine levels by its removal from the blood by dialyzing the patient's blood against fluid containing minerals similar to natural concentration of blood [13].
- Our findings of Creatinine in study group were consistent with the clinical studies done by Dushyant et al [2013] [12], Noor Ul Amin et al [2014] [6] Khaled et al [13] and Eduardo et al [2015]. These results confirm that hemodialysis is an efficient method to remove undesired substances from CKD patients, even when values are above the desired reference levels.

Table 2 shows level of urea in serum of patients undergoing dialysis i.e. in pre-HD and post-HD groups. Pre-HD had mean urea values 107.3 ± 33.2 , which is higher than the normal range and Post-HD mean values were 51.1 ± 21.0 . The results showed that dialysis lead to a significant fall in mean serum urea levels ($p < 0.001$) (Figure 5). Urea is major nitrogenous end product of protein and amino acid

catabolism, produced by liver and distributed throughout intracellular and extracellular fluid. In kidneys, urea is filtered out of blood by glomeruli and is partially being reabsorbed with water [12].

- Our findings of urea were supported by Israa [2013], Noor Ul Amin et al and Mahomoodally et al [2014]. Noor Ul Amin et al studied 70 patient and found clear reduction in urea levels. Mahomoodally et al showed that there was a significant decrease in the serum urea.

Table 3 shows the levels of total calcium pre-HD and post-HD. The mean and SD of serum calcium levels pre-HD is 7.3 ± 1.4 and post-HD is 8.2 ± 1.6 . The values are highly significant with p value < 0.001 . Calcium levels in the blood of both male and female of CKD of post HD patients are increased slightly than the pre-HD patients. It is clear from the data that both calcium levels are less than the normal values. Calcium is one of the key elements to consider in patients on dialysis due to its relationship with cardiovascular risk.

- Calcium is the most common structural element of bones and teeth and has numerous functions within the body. It is also involved in normal neuromuscular function and the clotting of blood. Anneke et al [2013] [8] found decrease in serum calcium levels post dialysis, which was not in accordance with our study. Our study was in accordance with Khaled et al [2015]

7. Conclusion

The effectiveness of dialysis in reversing any complication of uremia depends on the nature of that complication. Those disturbances which are due to the accumulation of a uremic toxin may be reversible if that toxin is dialyzable and if the removal rate by dialysis outstrips its generation rate.

References

- [1] Mahomoodally M. F, Nugessur H. Pre-and Post-dialysis correlations of se-rum α Amylase, creatinine and urea in Chronic Renal Failure patients. JMRD.2014; Vol.3 (2): 151-160.
- [2] Y. J. Anupama, G. uma. Prevalence of chronic kidney disease among adults in a rural community in south india. Indian journal nephrology, july 2014, vol 24 (4): 214-220.
- [3] Fauci, Braunwald, Kasper, Hauser, Longo, Jameson, Localzo, Mcgrawhill publisher. Principles of internal medicine, Harrison.16th ed.
- [4] National Kidney Foundation. K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification. Am J Kidney Dis 2002; 39: S1
- [5] Mohamed Siddig Mohamed Aliet. al. Hematological Changes Post-Hemo and Peritoneal Dialysis Among Renal Failure Patients in Sudan.2008, vol.19 (2).
- [6] Noor ul Amin, Raja Tahir Mahmood et. al. Evaluating Urea and Creatinine
- [7] Levels in Chronic Renal Failure Pre and Post Dialysis: A Prospective Study. Journal of cardiovascular disease. April 2014.

- [8] Maduell F1, Rodríguez Net. al., Dialysate calcium individualisation: a pending issue. *Nephrologia*, 2012; 32 (5): 579-86.
- [9] Anneke Bech, Louis Reichert, Darryl Telting, Hans de Boer. Assessment of calcium balance in patients on hemodialysis, based on ionized calcium and parathyroid hormone responses. *Nephrol* 2013; 26: (5) 925-930.
- [10] Herrington William G, Mason Phil D. Slowing the progression of chronic kidney disease. *British Journal of Hospital Medicine* 2009; Vol 70: 634-638.
- [11] Barsoum RS. Chronic kidney disease in the developing world. *N Engl J Med* 2006; 354: 997-999.
- [12] Israa A. Mohammed Jumaah. A study of some biochemical parameters in blood of patients with chronic renal failure, *Journal of Basrah Research-es Sciences*, Vol. (39). No. (4) A 2013.
- [13] Yuegang Z, Chengjun W, et al. Simultaneous Determination of Creatinine and Uric Acid in Human Urine by High Performance Liquid Chromatography. *Anal Sci.*2008; 24: 1589-1592.