

A RELATIVE STUDY ON RENAL FAILURE PATIENTS: EFFECT OF PRE AND POST DIALYSIS ON BLOOD PARAMETERS

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Abstract

Background: Renal failure has emerged as a curse to quality of life and fatality. It progress at a snail's pace with collapse of GFR. Hence for uplifting the detrimental consequences of the disease dialysis therapy has become requisite, which removes toxic compounds and metabolites from the blood. That's why we aimed at evaluating the pre-and post-dialysis blood parameters of patients undertaking dialysis as lifesaving remedy with the purpose to reveal the outcome of dialysis on renal failure. **Materials and Methods:** This research was taken up at Sankaracharya Medical College and hospital in Bhilai, Chhattisgarh during the period from August 2021 to April 2022. Age cutoff was taken as 45 to 70 years. Blood samples of participants were analyzed on time to time basis and raw data were processed summarized and scrutinized as per protocol using commercial kits. **Results:** Blood urea and creatinine was desperately higher in pre dialysis renal failure than post dialysis when assessed against controls. Serum calcium level although mildly recovered after dialysis but was lower against controls. In females, higher Calcium than control levels dropped drastically below control levels after dialysis. The higher Phosphates levels in renal failure was unaffected by dialysis although, subsided to an extent. Dialysis had a more dominating effect on female potassium levels than males. Sodium levels mildly improved after dialysis but still was below control levels. **Conclusion:** Dialysis definitely improves blood homeostasis and quality of life, but still needs remedial support for better management of renal failure.

INTRODUCTION

Kidney failure is a leisurely advancing disorder of the kidney progressing over a period of months and years. It is characterized by irretrievable rejection of glomerular filtration capacity and rate. Since there is apparent severe depiction of illness and henceforth special replacement therapy of renal system becomes obligatory for quality of life. One such treatment remedy is Hemodialysis. The incidence rate of kidney failure is mainly ruthless over the middle-aged groups and seasoned citizens suffering from hypertension, diabetes mellitus, uropathy and other autoimmune diseases. Its universal that the injuring effects of the disease over the nephrons is irretrievable and henceforth would sooner or later leads to entire kidney failure. Since the normal functioning of toxin and metabolite disposal of the kidney becomes compromised, the only feasible option in modern medicine tappers

towards Hemodialysis which involves artificially purifying the blood and removing the excess metabolites from the blood. All these understandings led our thought process towards analyzing the effect of pre and post-dialysis over the blood parameter of renal failure patients.

MATERIALS AND METHODS

This research was taken up at Sankaracharya Medical College and hospital in Bhilai, Chhattisgarh during the period from August 2021 to April 2022 including a sum total of 30 patients out of which 18 subjects were males and 12 participants were females. All selected participants were established renal failure patients from their clinical history, blood examination and requirement for haemodialysis. The study was forwarded in males and females subjects who had taken up dialysis as a treatment. Age cutoff was taken as 45 to 70 years.

Age and sex matched control groups mostly Hospital employees and patient relatives were also selected for cross reference whose Kidney function tests (KFT) were within permissible limits and were independent from any renal disease signs and symptoms. All the selected subjects were under recommendations and beneficiaries of dialysis therapy in the General Medicine Department of Shri Sankaracharya Institute of Medical Sciences. Procedural Ethical clearance was taken from the IEC and preceded for the study. Blood samples of selected participants were processed on time to time basis, and analyzed as per commercial kits and procedures. Most tests were run soon after collection or stored till analysis maintaining storage protocols. Raw data were processed and entered in excel sheets and were, summarized and scrutinized by SPSS version 24 software.

Inclusion Criteria

Participants under supervision of doctor and with Kidney failure.

Patients undertaking Dialysis therapy under Supervision of the Department of General Medicine. Patients willing to take part in the research with written consent.

Exclusion Criteria

Patients with other chronic disease.

Patients undertaking unprescribed medication.

Patients unwilling to participate or giving consent.

RESULTS

In this recent finding, all patient participants opting for dialysis were scrutinized for their blood parameters in order to reveal the outcome dialysis on each blood variable. The upshot was uncovered in mean \pm standard deviation in table – 1.

Table 1: Mean \pm SD of blood parameters in Pre and Post dialysis Males and Females patients

Males		Females	
Blood Parameters	Mean \pm SD	Blood Parameters	Mean \pm SD
Urea before dialysis	27.4 \pm 0.3	Urea before dialysis	27.5 \pm 0.2
Urea after dialysis	19.3 \pm 27.8	Urea after dialysis	12.6 \pm 0.3
Creatinine before dialysis	7.9 \pm 0.5	Creatinine before dialysis	7.9 \pm 0.5
Creatinine after dialysis	2.4 \pm 0.1	Creatinine after dialysis	2.4 \pm 0.1
Calcium before dialysis	1.6 \pm 0.2	Calcium before dialysis	2.8 \pm 0.4
Calcium after dialysis	2.0 \pm 0.2	Calcium after dialysis	2.0 \pm 0.2
Phosphate before dialysis	4.7 \pm 1.2	Phosphate before dialysis	5.0 \pm 2.3
Phosphate after dialysis	2.5 \pm 0.1	Phosphate after dialysis	2.5 \pm 0.2
Potassium before dialysis	4.9 \pm 0.9	Potassium before dialysis	4.1 \pm 0.9
Potassium after dialysis	4.1 \pm 0.11	Potassium after dialysis	3.85 \pm 0.08
Sodium before dialysis	130.7 \pm 2.0	Sodium before dialysis	135.8 \pm 1.4
Sodium after dialysis	136.0 \pm 1.5	Sodium after dialysis	140.6 \pm 0.1

Co-relative study illustrates a bright correlation among Phosphate and Urea. On the contrary, a pessimistic inter-relationship was seen between

Calcium & other parameters like Urea, Creatinine, Phosphate & Potassium and also in-between Sodium with Urea and Creatinine.

Table 2: Concentration of biochemical markers in normal healthy volunteers

Urea	Creatinine	Calcium	Potassium	Sodium	Phosphate
5.3 \pm 2.1 mg/dL	0.8 \pm 18.3 mg/dL	2.4 \pm 0.4 mmol/L	4.5 \pm 1.8 mmol/L	142.7 \pm 4.8 mmol/L	1.31 \pm 0.92 mg/dL

In our research finding, blood urea levels and blood creatinine levels in renal failure subjects showed a hefty augmentation before hemodialysis when measure up to to normal volunteers in both sexes. Although the levels decreased drastically after the commencement of dialysis but still way higher than control levels. While serum calcium level, was comparatively lower in pre-dialysis males and mildly improved after dialysis but was still lower when compared to controls. In the females group, it was observed to be higher in pre-dialysis cases against healthy controls, but the level lowered after the instigation of dialysis even below control levels. Taking serum Phosphates under consideration it was noted that the levels before dialysis were way elevated in both sexes than in comparison to the

control group. Although after dialysis, the level had subsided significantly but still was way above control levels. In males, the levels of potassium were mildly higher before dialysis compared to the control group but had steepened below control levels after taking up dialysis, while in females the levels were already below control levels and had declined more after dialysis. Again Sodium levels in males, as well as females, had already lower levels compared to controls in pre-dialysis condition which had improved to an extent after dialysis but was still fairly below normal control levels.

DISCUSSION

Kidney failure is a very slow-advancing disorder with irretrievable slaughtering of the nephrons. As the normal filtration capacity of the renal system is compromised, the blood Urea and Creatinine disposal is hindered and hence, a drastic augmentation before dialysis is observed. In our recent findings, the blood urea and blood creatinine levels were radically elevated in both sexes of dialysis patients. On the other hand, in comparison to pre and post-dialysis blood parameters and in contrast to controls, Urea and Creatinine were observed to be considerably lower after dialysis. These findings were concordant with the previous finding of Singh et al., in 2016. Singh enlightens the concept of renal loss due to depressed renal glomerular filtration, piloting towards the accumulation of various metabolites like Urea, Creatinine, and other elements in blood and ending with permanent destruction of nephrons. Nisha et al 2017 reconfirmed that in renal failure, although the boost in serum urea levels is seen to be relative to the disease progression, the protein catabolism products in such patients cannot be ignored. Hence our findings of higher blood urea & creatinine before dialysis and their drastic reduction after dialysis were also at par with the finding of Mohammed Jumaah, in 2013. Our result is visibly indicative of the removal of Creatinine and Urea from blood after dialysis as compared to the status before dialysis.

Phosphates again were observed to be considerably amplified in our study before the commencement of dialysis in renal failure subjects in both sexes, in relationship to control groups, which after the beginning of dialysis was markedly reduced. On the contrary, blood Calcium levels were observed to have mildly improved in males after dialysis than before but again the scenario was varied for female participants. Their calcium levels were seen to have been lowered in the post-dialysis state against pre-dialysis values. Although the status of calcium in dialysis patients was observed to be comparatively lower against the control group. This unanticipated result of our study was also partially at par with the findings of 2012 ventured by Shahbazi et al., and also of 2015 by Kim et al.

Fouque et al. in 2014 attempted to explain the status of regulation of phosphates by the kidney. He tried to verify the mechanism of parathyroid hormone action which increases against the decreasing calcium. Wojcicki, in 2013 testified higher phosphates in blood theatres are a key function in the progress of parathyroidism as well as osteodystrophy in subjects suffering from renal dysfunction or under dialysis. The compromised renal excretion of phosphate may be attributed to progressive complications. Proceeding kidney insufficiency trims down the renal excretion of phosphates leading to towering blood Phosphates

level and related complications. Very recently Hassen, Al-Lami, and Al-saedi, 2018 also reported stumpy blood calcium levels and amplified phosphate levels could be the answer to hyperparathyroidism. In our particular findings, blood electrolytes like sodium and potassium again had dissimilar statuses in different sexes. Pre-dialysis blood potassium in the female group was found to be lesser in comparison with the post-dialysis condition, although in males the level was more before dialysis and decreased nearly at par with ranges of the control group after dialysis. Serum sodium levels on the other hand, in both sexes, had a similar pattern of increased levels after dialysis compared to pre-dialysis states, although it was still lower than the levels in the control group. This was found to be concordant with literature studies of NaumanTarif et al. Few more researchers from literature had similar findings like ours, while quite a few had contradictions too. A very recent study of 2020 by Gulavani GA, Wali VV, Kishore V reported an increase in potassium levels after dialysis and higher sodium status in pre-dialysis condition.

CONCLUSION

A firm imbalance in blood parameter was perceived among renal failure patients. Hemodialysis forms an efficient and indispensable process to decrease the burden over kidneys. Routine blood work and may be effective in monitoring azotemia, requirement of dialysis and improving quality of life of renal failure patients.

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