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Study of impact of haemodialysis on chronic kidney disease patients in pre and post haemodialysis periods

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ABSTRACT

Introduction and Objectives: Chronic kidney disease (CKD) is progressive loss of renal functions. The degree of renal functions impairment correlates with the severity of renal failure. Hence patient needs renal replacement therapy. Haemo dialysis is one of the renal replacement therapy where in body's waste products including creatinine, urea and excess water are removed.

Objectives: To study impact of haemodialysis on CKD patients in pre and post heamodialysis periods.

Materials and Methods: This prospective study was conducted on 91 CKD patients from Jan 2017 to June 2019 in the department of Pathology and Nephrology, District hospital Vijayapur. All 91 patients renal functions were studied in pre haemodialysis period (before the first cycle of haemodialysis) and post haemodialysis period (After the last haemodialysis cycle after two half year). Regular follow up of these patients done during study period (Two and half years). Renal functions tests of these patients were assessed by testing the blood urea and serum creatinine and measuring urine outflow levels of each individual by using standard techniques in pre haemodialysis period then comparing those parameters with post haemodialysis period.

Inclusion criteria: Improved CKD patients and deaths of CKD patients.

Exclusion criteria: Acute Kidney disease patients.

Results: All 91(100%) patients renal function tests in pre haemodialysis period were highly impaired. 57 (62.6%) patients were having and high blood urea (150 -20 0 mg/ dl), high serum creatinine (11.1 -14 mg/ dl) and low levels urinary flow (ranging 200 -400 ml / 24 hours). 21 (23.1%) patients were ha ving high blood urea (100 -150 mg/ dl), high serum creatinine (8.1 -11 mg/ dl) and low levels urinary flow (ranging 401 -800 ml / 24 hours). 13 (14.3%) patients were havin g high blood urea (50 -100 mg/ dl), high serum creatinine (5.1-8 mg/ dl) and low levels urinary flow (ranging 801 - 1200 ml / 24 hours).

All 91(100%) patients in post haemodialysis period, renal function tests were done. It was found 55 (60.4 %) patients renal functions tests shows significant improvement with haemodialysis therapy. 32(41.7%) patients were showed improved blood urea (121-150 mg/dl), creatinine (7.1-9 mg/ dl) levels and urine outflow levels (400 -800 ml /24 hours). 11(12.1%) patients showed improved blood urea (91-120 mg/dl), creatinine (5.1 -7 mg/dl) and urine outflow levels (800 -1200 ml / 24 hours). 12(13.2%) patients showed improved blood urea(61 -90 mg/dl), creatinine (3.1-5 mg/dl) and increased urine outflow levels (1200 -1600 ml /24 hours).

There was significant improvement in blood urea, serum creatinine and urine outflow levels in post haemodialysis period of 91 studied CKD patients when compared with pre haemodialysis period parameters.

Major underlying cases for CKD were Chronic Glomerulonephritis in 62(68.1%) patients.

Conclusion: There is improvement in renal functions after the haemodialysis therapy. Hence haemodialysis will play a significant role in improvement of renal functions in chronic kidney disease patients.

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1. Introduction

CKD one of major global public health problem.[1] In United States over four million adults have CKD, reaching > 13% of the United States population.[2] It is estimated that weight of CKD patients increases by 2030.[3] CKD induces a slow and progressive decline in renal functions over a period of months and years due to complications of underlying kidney diseases like Diabetes nephropathy, Glomerulonephritis, Reno vascular diseases, Systemic autoimmune diseases, Cystic kidney diseases, leading to end stage renal disease. In CKD renal functions disturbances in the form of decrease in renal clearance leading to accumulation of urea, creatinine, other toxins and due to decrease in Glomerular filtration rate results in low urine outflow. Hence renal functions are predicting factor in CKD patients. Haemodialysis is one of renal replacement therapy for CKD patients. Initial stages of haemodialysis do not appear to influence the renal functions, but subsequent long period haemodialysis will help to recover the renal functions in CKD. Renal functions recovery can be assessed by measuring the blood urea, serum creatinine and 24 hours urine outflow in pre haemodialysis and post haemodialysis periods.

2. Materials a nd Methods

This prospective study was conducted on 91 CKD patients from Jan 2017 to June 2019 in the department of Pathology and Nephrology, District hospital Vijayapur. All 91 patients renal functions tests were studied in pre haemodialysis period (Before first haemodialysis cycle) and post haemodialysis period (After the last haemodialysis cycle after two and half year). Regular follow up of these patients done during study period (Two and half years). Renal functions tests of these patients were assessed by testing the blood urea, serum creatinine and measuring urine out flow levels of each individual by using standard techniques in pre haemodialysis period and then compared those parameters with post haemodialysis period parameters. 4ml of blood was drawn from each patient, centrifuged and blood urea was estimated by Urease-Berthelot method and serum creatinine was estimated by Jaffe's method. 24 hours urine outflow was collected pre and post haemodialysis periods, measured and compared.

2.1. Inclusion criteria

Improved CKD patients and deaths of CKD patients.

2.2. Exclusion criteria

Acute Kidney diseases patients.

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3. Results

In pre haemodialysis period all 91(100%) patients renal function tests values were highly impaired. 57(62.6%) patients were having high blood urea (150 -200 mg/dl), high serum creatinine (11.1-14 mg /dl) and low urine outflow levels (ranging 200 -400 ml / 24 hours). 21(23.1%) patients were having high blood urea (100 -150 mg/dl), high serum creatinine (8.1 -11 mg/dl) and low urine flow levels (ranging 401 -800 ml /24 hours). 13(14.3%) patients were having high blood urea (50 -100 mg/ dl), high serum creatinine (5.1 -8 mg/ dl) and low urinary flow levels (ranging 801 - 1200 ml / 24 hours).

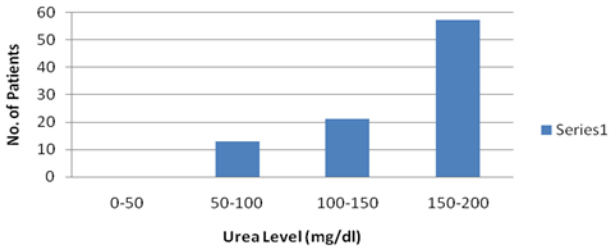

Fig. 1: Preadialysis blood urea level in CKD patients

91 CKD patients pre haemodialysis blood urea levels plotted in Figure 1.

91 CKD patients prehaemodialysis serum creatinine levels plotted in Figure 2.

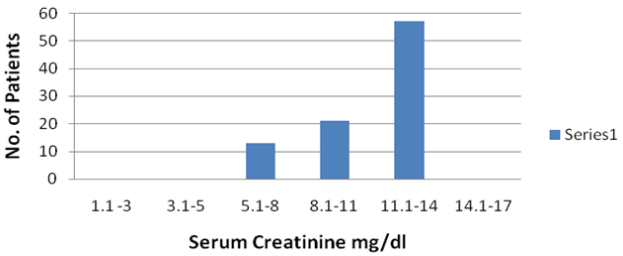

Fig. 2: Predialysis serum creatinine level in CKD patients

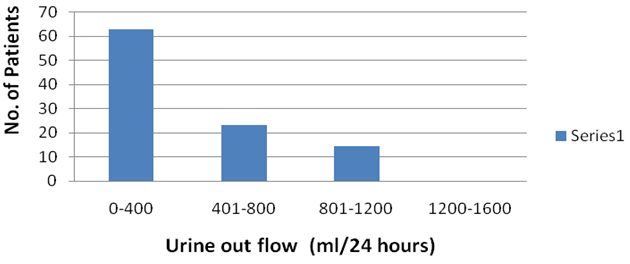

Fig. 3: Preadialysis urine outflow level in CKD patients

91 CKD patients prehaemodialysis urine outflow levels plotted in Figure 3.

In post haemodialysis period all 91 (100%) patients renal function tests were done. It was found 55 (60.4 %) patients renal functions tests shows significant improvement with haemodialysis therapy. 32(41.7%) patients were showed improved blood urea (121-150 mg/ dl), creatinine (7.1-9 mg/ dl) and urine outflow levels (4 00 -800 ml / 24 hours). 11(12.1 %) patients showed improved blood urea (91-120 mg/ dl), creatinine (5.1 -7 mg/ dl) and urine outflow levels (800 -12 00 ml / 24 hours). 12 (13.2 %) patients showed improved blood urea (61 -90 mg/ dl), creatinine (3.1-5 mg/ dl) levels and increased urine outflow levels (1200 -1600 ml / 24 hours). 17(18.6 %) patients died during haemodialysis treatment due to development of multi organ complications. 19 (20.8%) patients were not improved by haemodialysis and advised for kidney replacement therapy.

There was significant renal functions improvement in blood urea, serum creatinine and urine outflow levels in post haemodialysis period of 91 studied CKD patients when compared with pre haemodialysis period parameters.

Major underlying cause for CKD was Chronic Glomerulonephritis in 62 (68.1%) patients.

91 CKD patients post haemodialysis blood urea levels plotted in Figure 4.

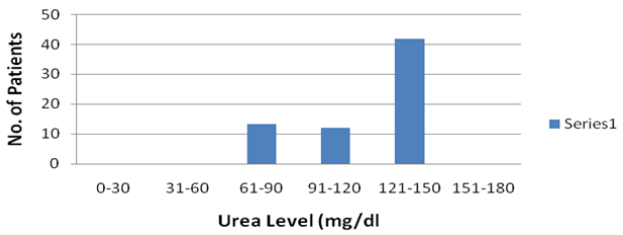

Fig. 4: Postdialysis blood urea level in CKD patients

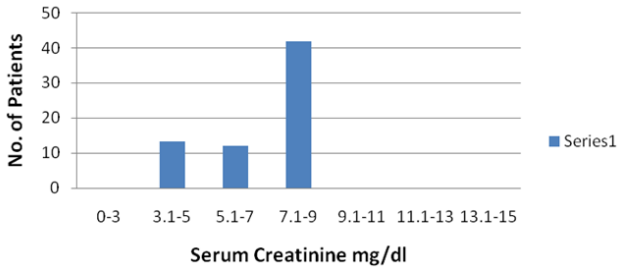

Fig. 5: Postdialysis serum creatinine level in CKD patients

91 CKD patients post haemodialysis serum creatinine levels plotted in Figure 5.

91 CKD patients post haemodialysis urine outflow levels plotted in Figure 6.

4. Discussion

It is thought to be recovery of renal functions in CKD patients requiring prolonged haemodialysis is a relatively

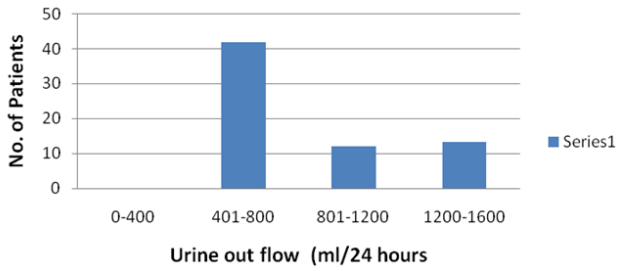

Fig. 6: Postdialysis urine outflow level in CKD patients

uncommon occurrence. Different parts of world, different observational cohorts studies of patients on prolonged haemodialysis, renal recovery reported as 1- 2.4%.[4,5] But United States End Stage Renal Data Programme (USESRD) suggest increasing rates of renal functions recovery over time.[6,7] US ESRD programme indicates that almost a third of patients who experienced renal recovery have a primary diagnosis for the cause of renal failure that is associated with acute kidney injury.[7] In our study we concentrated renal recovery due to haemodialysis in CKD established patients. During study it was observed that CKD is more common in male then in female patients and patients age between 40-60 years are more affected with CKD.[8] In our study there is improvement in renal functions in the form of decreasing in urea, serum creatinine levels and increasing in urine outflow levels. In our study 50% are established CKD within 6 to 12 months due to not recovered by episodes of acute renal failure, those CKD patients renal functions under nephrology care, were improved fast with in 6to12 months of regular haemodialysis. 30% of CKD patients with history of CKD more than 1 - 3 years, improved within 12 - 24 months. 20% of CKD patients with long period history more than 3 years improved within 24 to 36 months (Figure 7). Patients who died following haemodialysis were in cluded in our study but follow up was done until death.

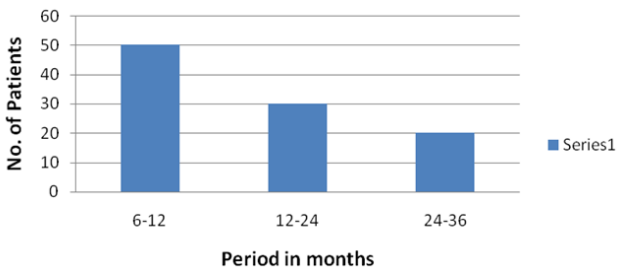

Fig. 7: Period of recovery of CKD patients

5. Conclusion

Rate of recovery of renal functions in CKD patients due to haemodialysis appears to be higher than previously reported

and appear to be increasing over time. CKD patients with not recovered by acute kidney diseases, who are initiated haemodialysis with nephrology care recovered fast with higher rates of renal functions improvement. Hence haemodialysis will play a significant role in improvement of renal functions and reduce the burden on kidneys.

6. Source of funding

None.

7. Conflict of Interest

None.

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