A Prospective Study On Therapeutic Management And Outcome Measures In Renal Failure Patients

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Abstract- Kidney is a vital organ of the body that plays a crucial role in filtering blood, removes including elimination of drugs maintaining fluid and electrolyte balance, releasing hormones to control blood pressure, stimulate red blood cell production, activating vitamin D to produce calcium leading to maintain bone health. Acute renal failure and chronic kidney disease are the two main conditions in renal failure. This study shows that managing of co morbid conditions hypertension, diabetes, coronary heart disease, congestive heart failure, left ventricular hypertrophy, infections, renal calculi, pulmonary diseases which are very essential in treatment of renal failure. The choice of treatment with balanced doses is prior in renal failure. **Objectives:** the main objectives are to understand and study the prescription-based drugs and dosage adjustment, Studying about the link between the disease progression and underlying causes, risk factors and also medication histories of patients for the possibilities. **Methods:** statistical analysis and parametric tests used based upon the requirement and evaluation. **Results:** patients with three or more comorbidities are subjected to morbidity compared to single. **Conclusion:** patients who are on long term therapy for cardiovascular diseases or neurological diseases are more likely to have renal failure and also the treatment for renal failure dosage regimens are individual, the outcomes depend upon the patient stage of renal failure.

Index Terms- comorbidities, treatment, renal failure

I. INTRODUCTION

Kidneys play vital role in filtering blood to maintain fluid and electrolyte imbalance along with removal of wastes such as processing of drugs, metabolic end products, regulates several body functions such as maintenance of blood pressure, initiation of red blood cell production, activating vitamin-D to maintain osseous system[6]. The rapid decline of normal kidney functions considered as renal failure, based on the abnormal kidney function renal failure is classified into two types i.e.., Acute renal failure and Chronic kidney disease[4]. Acute renal failure (ARF) is a syndrome characterised by rapid onset of renal dysfunction, chiefly oliguria (urine output that is less than 1 mL/kg/h in infants, less than 0.5 mL/kg/h in children, and less than 400 mL daily in adults) or anuria (urine output less than 100ml/day) and sudden increase in metabolic waste-products (urea and creatinine) in the blood with consequent development of uraemia. In considering national and international guidelines defined CKD, diagnosed, staging according to the measures of kidney function in GFR present for a period of 3 months or more, structural changes where normal kidney is replaced by parenchymal changes allows for a degree of risk stratification[3]. The long-term risk of CKD is not a single effect that is loss if kidney function but also the co morbid conditions like hypertension, diabetes, coronary artery disease, neurological conditions like stroke, abuse of NSAIDS and also the socio-economic deprivation mostly lie together to deteriorate the kidney function. The kidney function measures are the GFR rate, serum creatinine, urine output which are the main determinants also used for the staging and treatment[2]. Hypertension (blood pressure) treatment indicated is a calcium channel blocker (amlodipine) which is best first line therapy in CKD and β-blockers also show a Reno protective activity showing a development of dysregulated sympathetic system[1]. For diabetes sulfonylureas (glipizide, glimepiride) are safer compared to metformin preferred at any stage. Thiazolidinediones (pioglitazone, rosiglitazone) are much safer and effective in treating hyperglycemic conditions. DPP-4(dipeptidyl peptidase-4 inhibitors-alogliptin, linagliptin, sax gliptin and sitagliptin are recommended but require dose adjustments. Insulin is also recommended but in low doses based upon the glucose levels observed in patients. For infections during renal failure like sepsis then piperacillin and tazobactam are preferred with a half amount of normal dose. To treat pulmonary edema vasodilators , continuous positive airway pressure (CPAP) can be given, decompensated heart can be treated with IV-opioids (like diamorphine 2.5–5 mg, with care taken depending on the degree of respiratory distress) and an IV-infusion of nitrate (for example, glyceryl trinitrate 50 mg in 50 ml 0.9% saline). As for the acidosis condition in renal failure Reversing of acidosis is through administration of an alkaline solution—sodium bicarbonate, there by replaces and maintains the alkaline concentration and increases the intracellular tonicity. RRT (renal replacement therapy) is indicated in patient with ARF when the kidney function is completely reduced and so poor that life is at risk. RRT is considered as the last treatment option in renal failure which performs removal of toxins when symptoms aggravate like hyperuricemia, hyperkalaemia etc., removal of excessive fluid in conditions of unresponsive to diuretics like diuretic resistance, corrects the electrolyte and acid imbalances, controls the effect of sepsis (systemic infection).The common types of renal replacement therapy are: haemodialysis, peritoneal dialysis, hemofiltration, hemodiafiltration[5].

II. MATERIALS AND METHODS

The study performed was a prospective study performed in-patient setting at nephrology unit where patients with chronic kidney disease and acute renal failure were considered. The data collected from patient reports on daily basis and their therapeutic outcomes were studied. The study was carried out at a tertiary care hospital for a period of 06 Months. A study population of 85 in-patients (n=85) of both genders together were considered with renal failure. In this population patients with chronic kidney disease were n=59 and acute renal failure were n=26. The study population consists of all stages of renal failure along with their co morbidities. Study Criteria included Patients with acute and chronic renal failure**,** patients with cardio and cerebro vascular diseases, patients with diabetes mellitus and hypertension, systemic infections**,** patients with medication abuse, patients with thyroid disorders**,** patients with kidney structural changes**,** patients with progressive kidney diseases and excluded Patients with renal calculi**,** gender is not a criteria, pregnancy and lactating women**,** smokers and alcoholic**,** patients with renal cysts, patients who are not willing to participate in the study. Other material were lab investigations data are Serum creatinine levels, blood urea levels, thyroid function tests, complete blood picture, urine analysis, ultra sound abdomen, CT-scan KUB, blood glucose and serum electrolytes. Methods followed were data management and statistical analysis the information and data obtained is managed by MS-excel format, graphical representation, comparisons of outcomes with duration of stay were analyzed by using one way-ANOVA and the unpaired t test was performed. The KDIGO (kidney disease improving global outcomes) and KDOQI (kidney disease quality initiative) guidelines were followed while considering the treatment to renal failure patients. To calculate and stage the patients according to their eGFR the formulas used were Cockcroft and gault equation and MDRD in chronic kidney disease patients.

III. RESULTS

In this study in-patients with renal failure were considered and their treatment was observed, outcomes were measured. The patients having acute renal failure, chronic kidney disease were taken into where total (n=85) patients with CKD (n=59) about 69.4%,ARF(n=26) about 30.5% [CKD-chronic kidney disease, ARF-acute renal failure] The patients taken were categorized depending upon the age but not on gender as kidney diseases are common in both male and female. The mean of CKD age group is 5.9 (average=60.2) and SD=3.725 where as p(<0.005) Age group between 56-60 was found to be more effected found to be most affected with renal failure . The mean of ARF age group was 2.60 and SD=2.63 whereas the *p* value (0.0005). Patients with co- morbid conditions are observed with higher disease progression in case of renal failure which also leads to mortality. Patients with comorbidities (n=27) cardiovascular disease (CVS), infections (sepsis,glomerulonephritis, pyelonephritis) pulmonary disease (pleural effusions, asthma) are found to be 11(n=11/27) 40% are in risk of disease progression where as in ARF, patients with infections were found to be be 8 (n=8/16) 50% are more in risk of diseassse progression when compared with other comorbidities. In together seen that patients with CVS associated diseases were commonly found to be at risk as well as patients with all comorbidities are in large number compared to individual co morbidities. **Figure 2** showing the eGFR rate in CKD and ARF patients without co-morbidity and with single, dual and tri or more comorbidities. It has been found that patients with no co morbidity patients are having varied eGFR 19.445ml/min among chronic renal failure patients which is significant p<0.001 which can be achieved to normal through hemodialysis, as for comorbid conditions associated decline in e GFR is irreversible and only leading to mortality. If seen in ARF, no comorbidity's e GFR is 11.1ml/min (p <0.0005) which is also temporary can be brought to normal after treated on hemodialysis as patient has no co-morbidities can prevent disease progression.

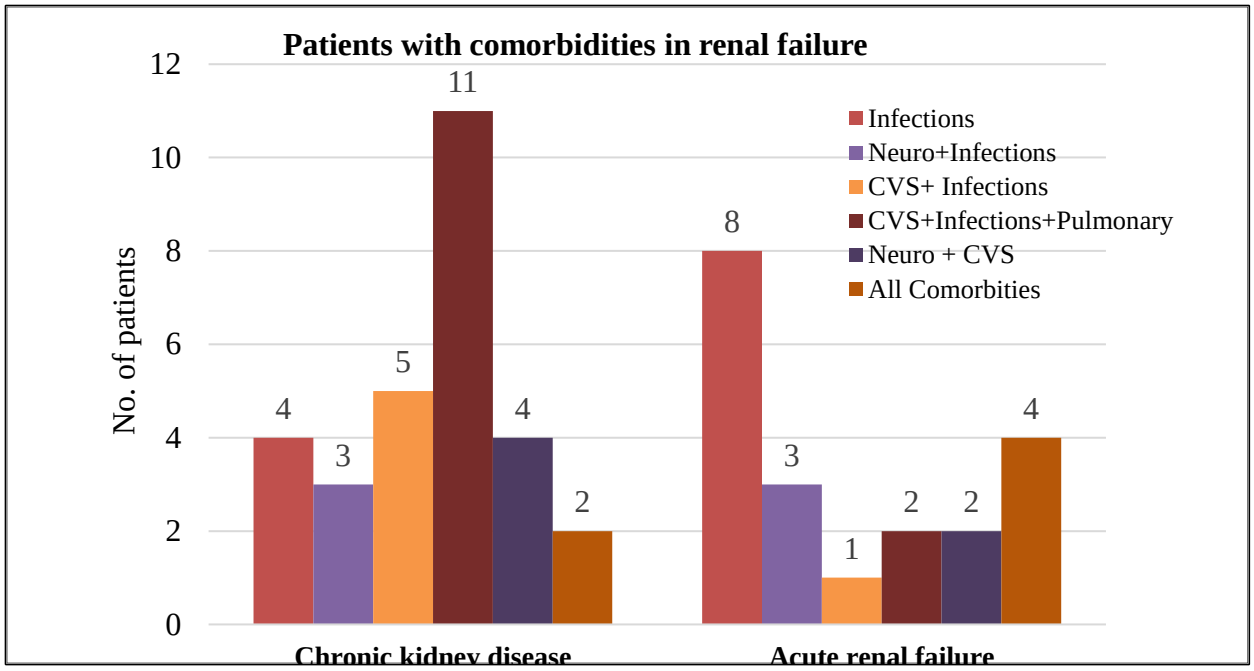


Figure 1: Patients with co-morbidities in renal failure

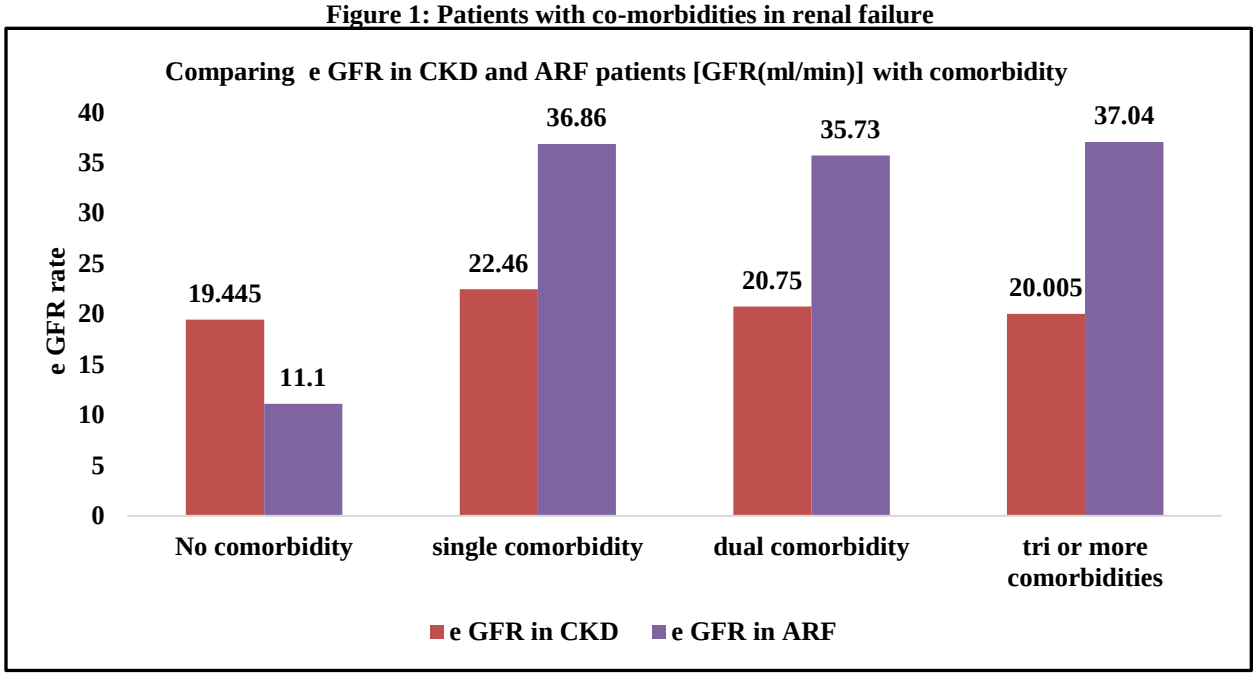
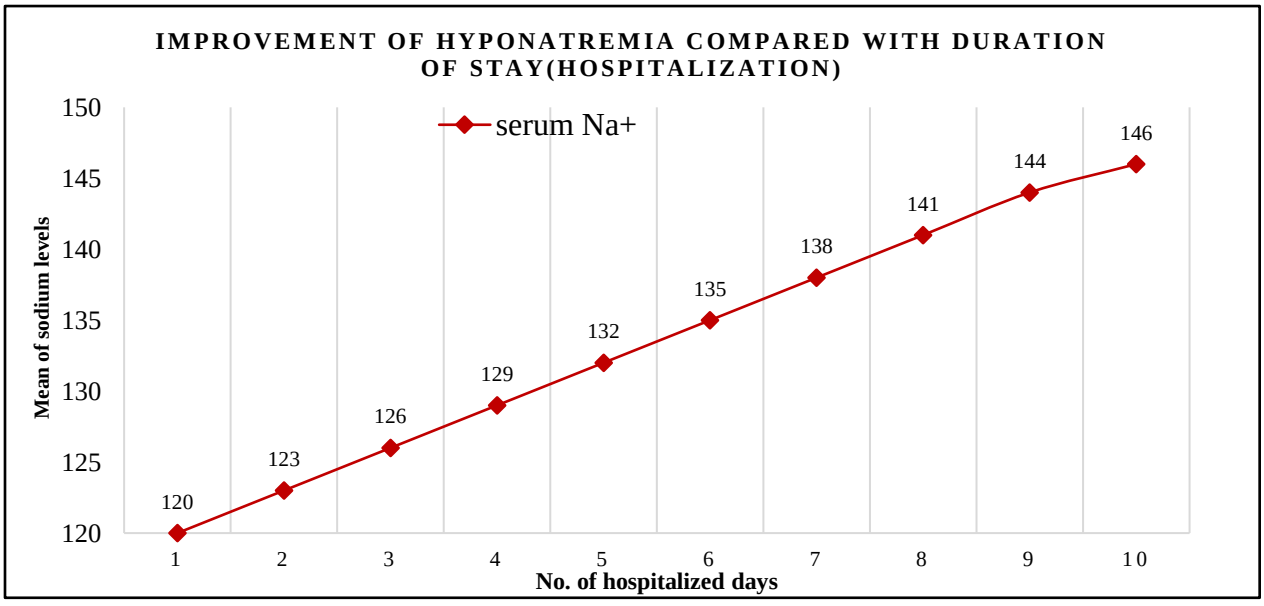


Figure 2: comparing e GFR (estimated glomerular filtration rate)of renal failure patients with comorbdies

Anemia is a common threat for all renal failure patients as kidney loses the function of producing erythropoietin. Treatment involves mainly human erythropoietin re-engineered darbepoetin 40mcg/kg per week. In this study(graph1) anemic patients(n=60) were treated with ESA (erythropoiesis stimulating agent) for six weeks i.e.,weekly once seen improvement about 3.3 g/dl of hemoglobin observed (p=0.0005)

Graph 1: improvent of hemoglobin levels in anemic patients after treated with ESA for on average 6 weeks

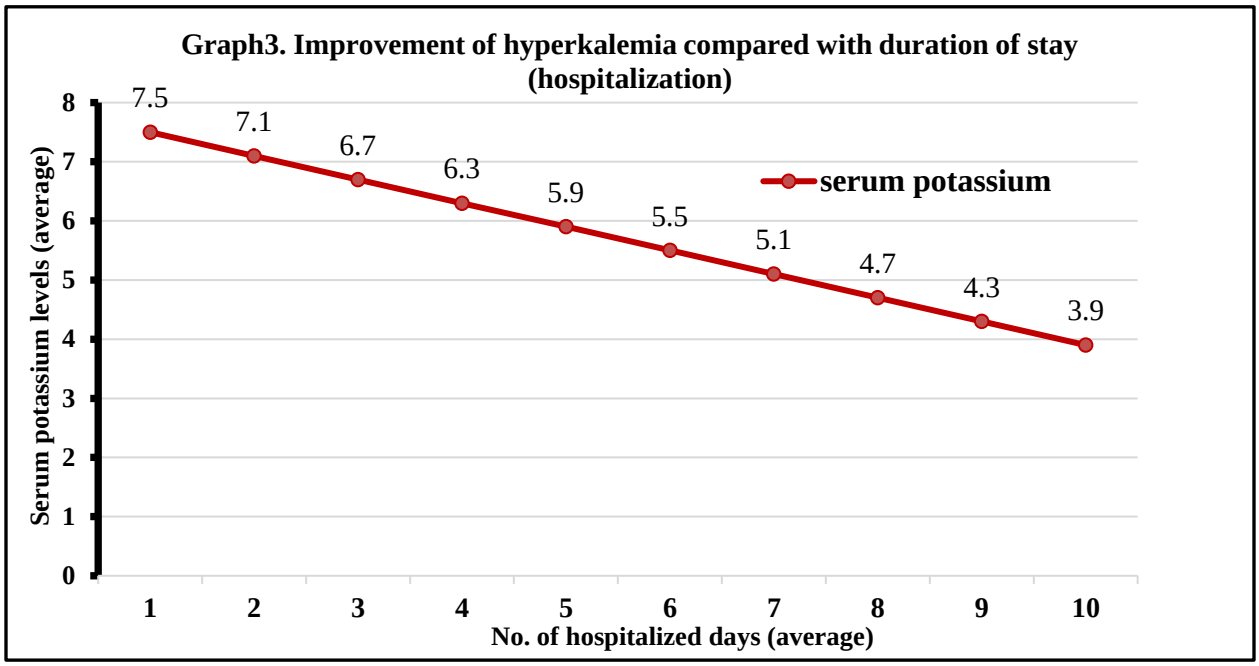


Graph 2: hyponatremia (low sodium levels) improvement after hospitalization

Graph 2 presenting the low sodium levels plotted with duration of stay Hyponatremia (low sodium levels) is a very common condition which requires immediate treatment. patients showing signs of hyponatremia in renal failure

condition leads to sudden loss of sensory, decreased heart rate sometimes leads to neurological disorders on long - term effect. The sodium levels the lowest was from 120 mmol/L and the improved level was 145 mmol/L after the treatment with diuretics (loop diuretics), 100ml of normal saline. Eventhough giving IV fluids is restricted in renal failure but for an immediate outcome fluids can be given but not for all the hospitalized days.

Graph 3. Hyperkalemia (high potassium levels) improvement with hospitalized days.



This study considered all the patients with hyperkalemia and treatment provided with diuretics (furosemide/spironolactone/torsemide) at lowest doses through IV then found that an improvement in the potassium levels as loop diuretics cause low potassium levels by sodium retention. The significance was found to be $p<0.005$ and null hypothesis rejected. Hyperkalemia also causes worsening of renal disease along with comorbidity condition like cardiac diseases, may be bleeding conditions also.

Drugs used in renal failure: **Table no.2 presenting the common and safer drugs used in treatment of renal failure.**

Drugs	Dose	Route	Frequency
Piperacillin + tazobactam	2.25g	IV	BD
Ceftazidime + tazobactam	2.25g	IV	BD
Amlodipine	5mg	PO	BD
Amiodarone	100mg	PO	OD
Carvedilol	3.125mg	PO	BD
Isosorbide mononitrate	10mg	PO	BD
Clinidipine	10mg	PO	BD
Metaprolol	25mg	PO	OD
Ivabradine	5mg	PO	OD
Furosemide	10mg/10ml	PO/IV	OD
Telmisartan	10mg	PO	BD
Diltiazem + amiodarone	90 + 100mg	PO	OD
Nifedipine	20mg	PO	BD
Lupulin	50 IU	S/C	Acc to GRBS
Human actrapid	40IU	S/C	Acc to GRBS
Inj.Basalog	100 U	S/C	Acc to GRBS
Glipizide + metformin	2mg + 500mg	PO	BD

Glicazide	**40mg**	**PO**	**BD**
Sitagliptin	**50mg**	**PO**	**OD**
Sodium bicarbonate	**1000mg/10ml**	**PO/IV**	**TID**
Inj. Nephessential	**100ml**	**IV**	**OD**
Inj. Tracemox	**3ml**	**IV**	**OD**
Calcitriol	**0.25mg**	**PO**	**OD**
Taurine, acetyl cysteine	**600mg**	**PO**	**OD**
Ketoanalogue	**100mg**	**PO**	**TID**
Sevalamer carbonate	**800mg**	**PO**	**BD**
Urseodeoxy cholic acid	**10-15mg**	**PO**	**BD**
Metazolone	**2.5mg**	**PO**	**OD**
Co-enzyme 10	**30mg**	**PO**	**OD**

IV. CONCLUSION

Renal failure is leading to high morbidity, effective treatment is required for better outcomes. So from the above we conclude that patients are showing improvement on providing a better choice of treatment plan considering their eGFR and adjusting the normal doses to renal doses is essential along with daily follow up on renal function tests, serum electrolytes, hemoglobin to provide further care.

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