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Research Article

Evaluation of Bone Metabolism and Liver Function in Post Renal Transplant Patients

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ABSTRACT

Background: Kidneys are responsible for removing extra fluid, minerals, and toxins from the bloodstream as well as maintaining blood pressure. When the kidneys are impaired, toxic wastes pile up in the body, raising blood pressure. It's possible that the body has too much fluid and isn't producing enough red blood cells. Kidney failure is the medical term for this illness. In the case of renal failure, therapy is required to replace the function that the kidneys ordinarily perform. Dialysis or a kidney transplant are the two treatment options available. Each treatment option has advantages and disadvantages. After deciding on a treatment approach, certain lifestyle modifications are required, such as eating and arranging daily activities.

Material and method: The planned study was done at the Department of Surgery as a single-center observational study. Before the patients were enrolled in the trial, they signed a written permission form. Blood samples will be obtained for normal follow-up in all studies. For the aim of taking blood samples, the patients were not exposed to any further intervention. A total of fifteen people had a kidney transplant. The patients' complete medical history, physical examination, and pre-transplant workup were all documented. All metrics were tested after three and six months.

Results: Pre-Renal Transplant Patients had a considerably decreased mean eGFR, as determined by the MDRD equation. Pre-Renal Transplant Patients had considerably higher mean values of Renal Profile Parameters (urea, creatinine, and uric acid). Pre-Renal Transplant Patients had substantially higher mean blood electrolytes parameters (sodium, potassium, chloride) and serum potassium. Pre-Renal Transplant Patients had considerably higher mean blood ALP levels, which might be an additional measure of rapid bone turnover.

Conclusion: According to the findings, continuous follow-up and thorough monitoring of bone mineral metabolites, hematological profile, and liver functions, as well as good patient counseling, can assist provide a holistic treatment to renal transplant patients. The study suggests that more research be done on the long-term effects of the transplanted characteristics. More studies with bigger cohorts and particular patient groups based on age and gender are also suggested.

Keywords: Acute Kidney Injury, Chronic Kidney Disease, GFR, PTH, Renal transplant

INTRODUCTION:

Kidneys are responsible for removing extra fluid, minerals, and toxins from the bloodstream as well as maintaining blood pressure. When the kidneys are impaired, toxic wastes pile up in the body, raising blood pressure. It's possible that the body has too much fluid and isn't producing enough red blood cells. Kidney failure is the medical term for this illness. In the case of renal failure, therapy is required to replace the function that the kidneys ordinarily perform. Dialysis or a kidney transplant are the two treatment options available. Each treatment option has advantages and disadvantages. After deciding on a treatment approach, certain

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lifestyle modifications are required, such as eating and arranging daily activities.[1]

In the last 45 years, India's living kidney transplantation program has grown to become the world's second biggest behind the United States. Since 1995, when the Indian parliament established a law on transplantation, it has been allowed to get a transplant from a deceased donor using neurological criteria to determine death. End-stage renal illness needing transplantation is expected to affect between 151 and 232 people per million in India. On the basis of an average of these numbers, it is predicted that almost 220,000 persons in India require kidney transplantation. Against this, roughly 7500 kidney transplants are conducted each year at India's 250 renal transplant clinics. Ninety percent originate from live donors, while ten percent come from deceased ones. Due to the lack of a national transplant registry, the data is not as reliable as it may be.[2]

Kidney transplantation is the treatment of choice for individuals with severe chronic kidney disease (CKD) who require continuous dialysis. It is typically linked with better results than dialysis.[3] Unfavorable post-transplant outcomes, including as cardiovascular events, death, or graft failure that necessitates dialysis, are nevertheless prevalent. Many prior research looked at predictors of death or graft failure in kidney transplant patients, but only a few looked at the link between pre-transplant characteristics and post-transplant outcomes throughout the dialysis period.[4]

It's possible that the presence and kind of posttransplant bone disease may go unnoticed, and that effective treatment will be delayed. Although glucocorticoid treatment appears to be a pathogenetic major component, immunosuppressive medications including tacrolimus, cyclosporine, azathioprine, and rapamycin undoubtedly contribute to its incidence and expression via their pleiotropic pharmacological actions. These medications have been demonstrated to improve total bone turnover as well as accelerate bone mass loss on their own. Only mycophenolate mofetil appears to have a neutral effect in this regard, based on currently available evidence.[5]

In the past, there were just a few reports that addressed this issue. To evaluate the relevance of the multiple elements involved in the disrupted bone remodeling following kidney donation, well-designed prospective trials with a sufficient number of patients are now required. Clinical data for an appropriate examination and management of kidney transplant associated bone disease are often inadequate while working up a patient for signs and symptoms.[6]

Material and methods

The proposed study is a single centre observational study was conducted in the Department of Surgery. A written consent was obtained from the patients before enrolment for the study. The participants were not bearing any monetary liability for the investigations involved in the study. All investigations shall be conducted with blood samples collected for routine follow up. The patients were not subjected to any additional intervention for the purpose of obtaining blood samples. Fifteen patients underwent renal transplant. Complete history, physical examination and pre-transplant work up were recorded for the patients. After three and six months, all parameters were repeated.

Inclusion Criteria

1. Age between 20 to 60 years.
2. Opting for Renal Transplant for the first time.
3. Patients who are willing to participate in the study

Exclusion Criteria

1. Patients suffering from primary hyperparathyroidism.
2. Patients on Vitamin D supplementation.
3. Patients who underwent thyroid or parathyroid surgeries.
1. Patients who received another organ or tissue transplant (e.g., liver, pancreas, and stem cell).
4. Patients with acute renal failure.

Result:

Table No.1- Comparison of Liver Test and Calculated Parameters in the study groups

Parameters	Groups		
	Pre	Post 3 months	Post 6 months
Urea (mg/dl)	133.11±25.47	28.59±12.39	25.17±10.62
Creatinine (mg/dl)	9.14±1.87	1.19±0.19	1.22±0.47
Uric Acid (mg/dl)	5.75±1.27	4.68±0.94	4.60±0.81
Sodium (mmol/L)	137.22±2.44	138.88±1.93	138.94±1.66
Potassium (mmol/L)	7.33±0.62	5.30±0.51	5.27±0.46
Chloride (mmol/L)	102.61±3.82	102.43±2.19	102.25±2.08
eGFR (ml/min/1.73m2)	8.26±1.47	88.51±14.79	84.58±20.44
Calcium x Phosphorus	49.72±10.63	28.08±3.16	23.68±4.36

Pre-Renal Transplant Patients had a considerably lower mean eGFR, as determined by the MDRD equation. Pre-Renal Transplant Patients had considerably higher mean values of Renal Profile Parameters (urea, creatinine, and uric acid). Pre-Renal Transplant Patients had substantially higher mean blood electrolytes parameters (sodium, potassium, chloride) and serum potassium.

Table No.2- Comparison of Bone markers and Renal Tests in the study groups

Parameters	Groups		
	Pre	Post 3 months	Post 6 months
Calcium(mg/dl)	7.44±1.05	8.16±0.52	9.13±0.41
Phosphorus (mg/dl)	5.15±1.22	2.24±0.38	1.47±0.40
Alkaline Phosphatase (U/L)	161.33±51.20	124.89±25.18	104.03±17.39
25(OH) Vitamin D (ng/ml)	20.02±5.01	24.20±7.04	29.37±7.32
iPTH (pg/ml)	322.16±214.11	112.52±77.80	76.64±51.14
AST (U/L)	33.40±105.01	25.83±8.36	27.66±5.43
ALT(U/L)	35.08±21.72	30.21±11.20	29.49±11.79
TBIL (mg/dL)	0.55±0.66	0.50±0.14	0.49±0.18
DBIL (mg/dL)	0.24±0.45	0.17±0.04	0.16±0.03
Total protein (gm %)	5.18±0.91	6.37±0.88	6.94±0.52
Serum Albumin (gm %)	2.42±0.58	3.44±0.47	3.54±0.44

Mean blood calcium levels were considerably lower in Pre-Renal Transplant Patients, although serum inorganic phosphorus and the ca x po4 product were statistically greater. Pre-Renal Transplant Patients had considerably higher mean blood ALP levels, which might be an additional measure of rapid bone turnover. Pre-Renal Transplant serum 25-hydroxyvitamin D levels were considerably lower. Pre-Renal Transplant Patients had considerably higher mean blood iPTH levels. Pre-Renal Transplant Patients had considerably decreased mean blood Total Protein levels. Pre-Renal Transplant Patients had considerably lower mean serum albumin levels.

Discussion

The kidney is one of our body's most significant organs, performing a wide range of functions such as blood filtration and waste excretion, as well as bone mineral metabolism, acid-base and waste balance, and RBC synthesis and maturation. CKD is a

prominent cause of morbidity and death across the world.[6] Renal profile chiefly includes estimation of blood urea, serum creatinine, eGFR, uric acid and electrolytes namely Na+ , K+ , Cl- .

Serum uric acid has recently been identified as a separate risk factor in the development of cardiovascular problems.[7] Recent studies have looked at and proven the potential of uric acid as a predictor of illness development in a variety of disorders. Similarly, the relevance of uric acid in detecting CKD development has been proposed. In CKD patients with hyperkalemia, Genoresi et al found a 2.7-fold higher risk of sudden death. **Pun et al. (2017)** found that a K+ level of more than 5.0 mmol/L raises the risk of abrupt cardiac arrest.[8]

In CKD patients with normal liver function, elevated ALP is indicative of high bone turnover disease with improvement in the level of other bone-mineral metabolism markers, serum ALP levels were also found to improve in the present study. **Stavroulopoulos et al 2007** reported extremely high prevalence of vitamin D deficiency or insufficiency in the first year following transplant.[9]

The current study was designed as a follow-up to compare several bone mineral metabolites and other biochemical indicators in post-renal transplant patients to their pre-transplant profiles. Early diagnosis and good management of risk factors may lower the increased morbidity and mortality associated with CKD, preventing or delaying further advancement of renal failure and its associated consequences.

Conclusion:

A frequent symptom of CKD is a change in bone-mineral indicators. The improvement in kidney function following a transplant must also be considered in the context of bone-mineral metabolism. Calcium, phosphorus, vitamin D, and iPTH are all intertwined in the body's calcium, phosphorus, and vitamin D balance. As a result, patients must follow rigorous dietary guidelines, therapy, and complex pharmaceutical regimens. These variables make it difficult to achieve and sustain SHPT control. Regular monitoring and long-term control of bone and mineral metabolism indicators can significantly reduce the chance of developing BMD after a kidney transplant while also enhancing quality of life.

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